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RELATIVITY AND THE RELATION OF SCIENCE TO PHILOSOPHY

THERE are despite the stern and often irate remarks of certain scientists, and the avowed policy and practice of certain philosophers to the contrary, many indications that science and philosophy are entering into a more intimate relationship. One has only to note the serious work done in philosophy by such scientists as Lloyd Morgan, Russell, Driesch, J. S. Haldane, Poincare, and Whitehead; and the consideration of the problems of science by such philosophers as Ward, the Lord Haldane, Broad, Alexander, and Montague, to realize that this is true. It may be added also that this tendency has reached such a stage in England that Oxford has already attempted to set in operation a program bringing the departments of science and philosophy together, and that a national educational commission composed of scientists and philosophers has been working on the problem. It is to a consideration of the need for such a relationship, and of the way in which it may be realized that this paper would direct attention.

The need on the part of philosophy for the vitality which the concrete evidence of science would provide, is quite obvious. It is not so obvious however that there is, scandalous as the statement of the fact may sound, a reciprocal need on the part of science for the aid of philosophy, or rather for the aid of a philosophy of a certain kind.

There are problems arising in every science, most fundamental since they involve the concepts upon which the

science is based, and in terms of which its findings must be interpreted, which cannot be solved by that special science alone. They lead beyond that science and often beyond every other natural science. They have their locus in the general characteristics of nature or fact as a whole. Often only one aspect of the problem appears in the science in question. Thus even if this science should be able on the basis of this aspect to frame some kind of an answer, it would be subject to the fallacy of presenting as the solution for a problem, a conclusion based on the partial evidence pertaining to but one aspect of the problem. This is to substitute inference from an aspect of the facts for a straight-forward observation and analysis of the facts themselves. Such a procedure is contrary to the method and spirit of the scientific mind, which will never accept conclusions reached indirectly by inference from partial evidence, when experts can observe and describe the complete evidence directly. Let us consider a case in point.

In the seventeenth century Newton with the insight of a genius, set down certain fundamental concepts which formed the basic notions of mechanics. So precisely did these concepts and relations represent the processes of inorganic nature, that after two centuries of intensive experimental investigation by physicists, scarcely a single fact appeared which could not be accounted for in terms of the deductions which followed from them. Then in the eighties of the last century, after the work in optics had necessitated the positing of an ether, an experiment by Michaelson and Morley on the relation of moving bodies to the ether, gave an unexpected negative result which could be consistent with the traditional notions only if certain rather absurd consequences with reference to the shortening of a body in the direction of its motion were accepted, and only if certain observable physical effects of strain should reasonably be assumed to appear in certain bodies under

motion, which experiments showed not to exist. For these reasons and also because there existed a traditional fundamental conflict between the principle of relativity of classical mechanics and the principle of the uniform velocity of light of classical optics, the basic Newtonian notions were brought into question.

The problem arose, consequently, as to the resolution of this conflict between the forgotten principle of relativity of classical mechanics and the principle of the uniform velocity of light of classicals optics. Experiments and analysis indicated that both principles were true. It seemed impossible to reject either one. This lead Einstein to question the validity of the principle of the addition and subtraction of velocities, since if the latter principle should not hold under all circumstances, the contradiction between the principle of relativity and the principle of the uniform velocity of light might not exist. But this principle of the addition and subtraction of velocities could be false in certain cases, only if space and time were not absolute, but relative. Thus Einstein was lead to the question of the nature of time and space.

Now what must be noted is, that at this point Einstein was faced not with a problem restricted solely to physics, but with a problem which has its true locus in philosophy. What is the relation of space and time and objects? This is a question which involves the most general characteristics of nature and fact as a whole. It is a question, not which physics studies, but the answer to which, it presupposes. This becomes evident if one goes back to Newton. The classical Newtonian notion of the nature of the status of objects and space and time—namely, that there is an absolute independent something space, and another absolute independent something time, in which a third absolute independent something, inert matter, moves—this, the classical Newtonian notion was not discovered by Newton

nor by the physicists previous to Newton. It was a conclusion reached by philosophy and so universally accepted in popular circles at least that Newton took it for granted and presupposed it in all his work. The problem which Einstein raised in physics was therefore, a philosopher's problem.

Einstein could not, however, get an answer to it from the philosophers for he knew without taking the trouble to ask, that they were no longer interested in the problems which concerned their predecessors, but were spending their time in rationalistic discussions in epistemology or largely in moral science. Hence, Einstein had to draw the best conclusions that he could from the aspect of the space-time-substance problem which appeared in physics. So he did not ask the question, what is the actual meaning and relation of space and time and objects which a careful description of them as they appear in nature or fact discloses? This is the philosopher's question, and the only one which can bring forth a decisive conclusion. But Einstein made no pretenses at being a philosopher. Instead he asked the more restricted but less ultimate question, What do I as a physicist know about space and time? What answer to the question as to wether space and time are absolute can I get from the aspect of space and time and the precise meaning of space and time with which I am acquainted in physics?

It is important to note that this means that the particular theory of space and time which Einstein gives will not be a final ultimate theory, unless it should happen that a theory which is adequate to account for the aspect of space and time that appears in physics is also adequate to account for the complete characteristics of space and time which appear in the rest of nature and fact. Whether Einstein recognized this limitation I cannot say. It may be noted,

however, that the question which he asked was, What do I, *as a physicist,* know about space and time?

Now it happened that what he knew about space and time as a physicist was sufficient to show that one can no longer regard our measurements of them as absolute. This was sufficient to indicate that the principle of the addition and subtraction of velocities did not hold and therefore sufficient to bring a reconciliation between the results of the Michaelson-Morley experiment, the principle of relativity of classical mechanics, and the principle of the uniform velocity of light of classical optics. This reconciliation made possible by the denial of space and time as absolute is the special theory of relativity.

With reference to this theory it is important to note that Einstein's conclusion is negative. His evidence and analysis shows merely that space and time can no longer be regarded as absolute as measured. As to how precisely we are to regard them, as to the precise positive meanings of space and time and substance which physics is to put in place of those presupposed by Newton, it gives no clue. This can be given only[1] by a direct careful study of the actual characteristics of objects and space and time in experience, which it is the special business of philosophy to pursue.

This dependence of science upon philosophy has been overlooked and forgotten largely because the philosophers previous to Newton, particular the ancient Greeks, did their work so thoroughly that until Einstein no flaw appeared in the scientific superstructure sufficient to make scientists aware of the philosophical foundations upon which science rests. In other words we must conclude that it is the soundness of certain conclusions of philosophy accepted by Newton, which has given the scientist the sense of complete independence from philosophy which he

[1] A hypothetical theory can, of course, be posited arbitrarily.

has enjoyed up to the present time. This acceptance from philosophy of certain conclusions with reference to the general characteristics of nature and fact as a whole is the price which every science must pay for the chance to specialize. Otherwise it would be necessary for it to study everything. On the other hand dependence upon science for the particular findings attained by limitation to a narrow field, is the price which philosophy must pay for the chance to study the general characteristics of fact as a whole. Otherwise it becomes insipid and innocent of the stern specific facts of existence. Both science and philosophy are dependent upon each other and both have lost sight of this dependence.

A brief consideration of the developments following Einstein will indicate this in a more precise way. It has been indicated that Einstein showed that space and time can no longer be regarded as absolute as measured. It is evident therefore that whatever is said by philosophy in the future about space and time will be inadequate unless it takes this fact into consideration. This indicates most concretely the dependence of philosophy upon the findings of a special science. On the other hand, it does not follow that a theory of space-time is true, merely because it accounts for these facts of Einstein. It must also account for all other characteristics of space and time. Thus physics is dependent upon philosophy, for it is philosophy which specializes upon the study of the general characteristics of nature and fact as a whole in which the problem of space and time in their relation to objects has its actual locus.

It happens that this is not a mere logical possibility but the actual state of affairs. If one turns to pages 22 and 23 of Einstein's book, *The Theory of Relativity,* one will find that it is necessary for him as a physicist, defining time as it appears to a physicist, to define it in terms of the absolute velocity of light. Though this may be true

for a physicist according to the order of his procedure, it is evident as Whitehead has indicated that it is not an essential notion in a knowledge of time . Certainly all of us are aware of space and time, and certainly most of us at least have acquired that knowledge without any knowledge whatsoever that there was such a fact as the absolute velocity of light. Such a conception of time has all the earmarks of a theory reached by inference from partial evidence with certain technical presuppositions in mind. It is this among other considerations which has lead Whitehead to question Einstein's positive theory of time (not his negative theory that time and space are not absolute), and to enter philosophy where he can reach a conclusion, not by inference from the limited data and technical presuppositions of physicists, but directly by a careful scientific observation and description of fact and the status and relation of space and time and objects in fact. The fundamental spirit of science which drives one directly in any problem to the facts in question, is certainly in accord with Whitehead's approach through philosophy.

This recourse to philosophy becomes the more obviously necessary, when one realizes that so far as the evidence of physics is concerned, there are two positive theories of space and time which may be true. The one does away with space and time as absolute entities independent of substance, by enlarging our conception of substance so that space and time become its qualities. In this case matter is negated as the substance which physics regards as constituting the inorganic world and replaced by "events" which have the extension or inter-relations necessary to account for space, and the creative "duration" of "passage" necessary to account for time. This is Whitehead's answer. The other alternative is that space and time are not in nature at all, but are contributions of the mind of the observer. This is Eddington's answer. With reference to

these two answers certain facts are true. First, both are entirely consistent with Einstein's conclusion that space and time are not absolute. Second, each gives an entirely different conception of the subject-matter of physics and of the meaning of its concepts and findings. If Eddington's answer is correct the physicist is doing little more than playing with his own ideas. Physics is not concerned with nature, but with a number of conventional concepts and relations which as Russell states it, the scientists has "plastered on to nature." To use Eddington's own words (p. 200, *Space, Time and Gravitation*), "This knowledge (of physical science) is only an empty shell, a form of symbols." However, if Whitehead's answer[2] is correct all that has happened is that nature which science thought to be made up of matter in space and time, is constituted instead of substances called "events" possessed of the extension and interrelations necessary to give rise to space, and the creative characteristic termed "passage" necessary to give rise to time. Before physics can value the findings of its centuries of investigation and determine the meaning of its concepts, it must chose between these two alternatives. The interesting fact, however, is that so far as the evidence of the physicist is concerned either theory may be true. In other words the facts which can give a solution to the physicists problem are to be found only in philosophy.

It is the merit of Whitehead's answer that it is based upon a recognition of this fact. It is the demerit of Eddington's conclusion that he assumes on the very first page of the preface to his book on relativity[3] that the work of Einstein has as he states it, "relegated space and time to their proper place the observer." This follows only if there is no other conclusion consistent with the facts, which as we have just noted is not the case.

[2] *The Concept of Nature.* Cambridge University Press.
[3] *Space, Time and Gravitation,* A. S. Eddington. Cambridge Press, 1921.

From the moment when Einstein's suspicions as to the validity of the principle of the addition and subtraction of velocities raised the question as to what we mean by space and time, up to the present when different positive theories are being brought forward, there is an accumulation of evidence indicating the dependence of science upon philosophy.

If philosophy is to meet these demands placed upon it by science, it becomes evident that it must include the findings of science in its subject-matter, and take on the spirit and method of science in its proceedure. By this last statement we mean that it must apply to the study of the general characteristics of nature or fact as a whole which is its domain, the same emperical methods of description and observation and analysis which a special science applies in the special part of fact which is its field. Only when the philosopher by a use of this method is able to give to a science conclusions based on a direct description of the facts and their relations in question, can philosophy provide science with anything better than that which science can get for itself. For a scientist can enter into a dialectical argument, or a rationalistic discussion of the possibilities. He can even infer a conclusion from the partial aspect of the situation which is before him. The only conclusion from philosophy sufficient for his demands must rest not upon any dialectical or other rationalistic method, but instead upon a direct first-hand emperical observation and description of the facts in question. Only a philosophy strictly scientific and emperical in its method can meet the demands of science.

This requirement for philosophy makes it invaluable if not a necessity that philosophers be acquainted with the proceedure and spirit of science—not merely as one finds its methods distorted into the rules which fill text-books on inductive logic, but also as it is evidenced in the

motives, insight, and habits of mind and hand of the great men of science.

There are certain objections against a scientific emphasis in philosophy which demand consideration. The first is that it would withdraw from ethics and religion, the philosophical interest which should be directed into those subjects. Quite the contrary, however, should be the case. The emperical method should result in more time being spent upon describing and separating from the philosophical and theological theories which surround them the real bases of the religious experience, thus bringing both ethics and religion more and more out of the realm of hope and theory, into the realm of fact. Religion has everything to gain from a philosophy which will study it directly on its own merits, rather than indirectly by means of inferences from a questionable epistemological position.

The second contribution to religion and ethics of such a scientific philosophy is of even greater importance. It arises because an ethics or a philosophy of religion which does not deal seriously and directly with the facts of science, never meets the outstanding issue and challenge which ethics and religion face today. This issue may be stated as follows: Have we any right in view of the indisputable evidence which science gives us to regard these so-called facts of the ethical and religious experience as facts at all? What right has one to believe in a God, if science indicates in the tremendous amount of evidence supporting the atomic theory, that the individual and this objective something which is over against him is not a unity but an aggregate of material atoms hitting together by chance? Why believe in or work for a better world and a better life if the inevitable outcome of all our efforts must eventually be a process of evolution, driven by the second law of thermodynamics into a process of devolution which will bring every human and every clod of earth to chaos and dust?

It is obvious that this issue can be honestly met only by a philosophy which comes definitely to grips with the facts of science. It is equally obvious that any philosophy which bases its conclusions practically completely upon a discussion of abstract categories, or upon epistemological, subjective, or even partial objective data, and refers not at all or only casually to the facts of science not only runs the risk of becoming as insipid, and unconvincing, and as Santayana remarks, as "spiritually nauseating" as any conclusion must be which ignores the negative evidence but also does positive harm by intensifying the opinion that religion dares not face the accepted facts of science.

The second objection to such a union between science and philosophy is that it would impose upon philosophy an impossible task.[4] The objection affirms that such a philosophical undertaking, if it is to amount to anything would require more scientific knowledge upon the part of the philosopher than any scientist pretends to possess. This objection rests I believe upon a confusion of the issue which is involved. It is not a question as the objection implies, as to whether the philosopher is going to attempt the impossible, for the problem which we are demanding that the philosopher attack, is not one which would be faced only by the philosopher. Instead it is one which is being met and decided upon usually unintelligently by every human being including layman and scientist alike. What is the meaning of existence? Upon what principles am I to base my conduct and the policy of my business organization, my labor party or my nation? The real issue is, are we going to continue to flounder socially, internationally and religiously because we persist in accepting answers upon the nature of existence as a whole which are based on only part of the available evidence? How much longer is society to get the exact implications of science with reference

[4] *Monist*, July, 1923, p. 447ff.

to the less significant questions of the commercial world, while the implicational resources of science with reference to the major questions of existence go untouched and unexplored? It is not a question of attempting the impossible, but rather of attaining the best answer of which the logically trained mind is capable, with reference to the exact available information at hand.

As has been hinted, the importance to society of a synthetic scientific philosophy is very great. Although there has come with the advances of modern science, a great increase in information, there has also resulted because of the specialization of the sciences and the separation between the humanities and science and philosophy, an increase in conflict and contradiction with perhaps even a decrease in understanding. One aspect of experience implies one consequence, another aspect a different consequence. Hence the danger is that the human mind will give up the attempt to think and act intelligently, and will cling blindly to outworn standards. The inevitable result of this will be an increase in the present dissension which threatens to tear society to pieces. Is it not therefore true that the human mind and society today perhaps even as never before, needs philosophy and the critical, synthetic, comprehensive view of things which it is the business of philosophy to give? I also venture to suggest that science has reached a point in its development when the work of the special natural sciences cannot go forward, until our study of the togetherness of things catches up with our study of the discreteness of things. For example, biology is at that stage where an understanding of the organism cannot be attained except by an analysis of the relation of the organism to the rest of the universe. There are very definite indications also that the stability of the atom cannot be accounted for wholly by an analysis of the forces inherent in the individual electrons which make up an individual

atom. The inability to account for the stability of organic or even atomic systems in terms of the inherent properties of the constituents of the systems, is leading science beyond the particular system to the whole of nature of which the particular forms a part, for an explanation of the stability which exists. Thus the very specialization of the natural sciences is revealing the problems of science as insoluble in terms of the discrete particular systems to which a special science limits itself, and is thereby indicating the necessity of another science which will study the bearing upon a particular system of that system's relation to the other particular systems which make up the whole universe. What appeared first in mathematics when its reduction to logic revealed certain of its problems to turn upon problems in philosophy, is becoming increasingly evident in the other sciences.

A careful consideration of the demands of ethics, religion and society, and an understanding of the problems of science in biology and atomic theory as well as in relativity reaffirms the need for a philosophy which will include the findings of science in its subject matter, and undertake with the same precise empirical, descriptive methods as any other special science, the study of the general characteristics and interrelations of nature or fact as a whole.

Having recognized the need for a working relationship between science and philosophy, the question arises as to how this need is to be met. It is obvious that the major changes and advances must come from philosophy. It will become necessary however for science to recognize its dependence upon philosophy and to encourage with a friendly attitude the type of philosophy which will meet its needs. Our problem resolves itself therefore into the question. What are the characteristics of a philosophy which can enter into this relation of mutual dependence with science?

It is obvious that both disciplines must be given complete independence in their respective fields and functions, while at the same time keeping the relationship sufficiently close and friendly so that one can get from the other that which is needed. The question arises therefore, as to the field and function of philosophy.

It has already become evident that philosophy is or should be a special science, similar to any other special science, differing, not in the method which it uses, but in the special field which it studies. Whereas biology for example specializes on the concrete detailed characteristics of certain individual systems in nature, namely living organisms, philosophy specializes on the general characteristics of nature or fact as a whole. While the one gains in intensive concreteness and detail, it loses in extensiveness and relatedness, and while the other gains in extensive concreteness and relatedness it loses in local detail and intensive concreteness. Both are alike in having a special region of fact, with reference to which by the same identical method, the ultimate entities and relations involved are being determined. In this respect philosophy is a science. It is the science which has as its field the general characteristics[48] of nature or fact as a whole.

But philosophy is more than a special science. It is in addition that which makes it philosophy. That is, it has the additional function which is not inductive and analytical, but deductive and synthetical, of bringing together its findings as a special science, with the findings of the other special sciences to give a comprehensive conception of the whole of fact, both as to its general and as to its specific characteristics.

One of the characteristics of philosophy as a special science is that it must be scientific in spirit and method. This

[48] By "general characteristics" one means characteristics which are not limited to certain systems or parts of nature, but are found throughout the whole of nature or fact.

means, to repeat, that it must apply to the general characteristics of fact which is its domain, the same empirical methods of observation and description and analysis which any other special science applies to the special region which is its field.

A second characteristic of philosophy as a special science is that it must present its conclusions in terms of concepts which science can use. The Kantian notion of space and time is of no use to physical science, because it gives no clue as to precisely how space and time relate themselves to the remainder of fact. When one has said that space and time are the contributions of mind there is nothing more to be said about them. Concepts if they are to be of use to science, must be deductively fertile. They must give rise deductively to the special instances of them with which the special sciences are concerned. This necessitates that they be precisely defined, unless they are primitive concepts in which case they must be precisely described. A failure to understand this necessity has prevented a full appreciation of the work of philosophers in this field. It is quite obvious if all one desires in philosophy is to present the general conception of nature which description and analysis reveals, that one can do it in most readable fashion, with all the charms of a beautiful literary style. But if one is trying to determine the ultimate entities of nature in so precise a way as to give rise to geometry and to an equation for gravitation, then poetical metaphors and literary gestures will not suffice in philosophy any more than they do in physics. Concepts of philosophy which can be used by science must be precisely determined. This is the more necessary when one has discovered new concepts, similar to the old ones, yet involving slight differences which are fundamental. Such new concepts can carry the meaning of the old, together with the meaning of the new only when defined with a precision that

indicates the fine distinctions involved. Philosophy in its function as a special science must be scientific in spirit and method, and also precise in its designation of the concepts which that method reveals.

At this point I can imagine certain philosophers asking the question, Why must philosophy fit its methods to the demands of science? Surely philosophy exists for other ends. This objection assumes, however, that there is a conflict between the type of philosophical method which will produce good philosophy and the type which will produce adequate concepts for science. A careful study in logic of the factors upon which any system of knowledge depends, will indicate, I believe that the empirical method in philosophy is the only method that will produce sound philosophy. Until through an appreciation of the essential merits of a strictly descriptive proceedure one learns to keep a sharp distinction between fact, which is previous to philosophy, and the theories offered by philosophy as an explanation, there will be no hope of any agreement or progress. For unless as one is building or after one has built one's philosophy, there is some body of data, or some datum, namely fact to which one can appeal, there is no way of telling, when two explanations differ, which is true. All that deductive logic or rationalistic proceedure can give is consistency. Only an empirical method can determine (and even then only after the larger portion of one's effort has been spent on describing rather than explaining) whether one consistent theory or another is true. Unless previous to any philosophical explanation, there is a description of fact recognized as independent of all philosophical theory there is no court of appeal when two philosophers differ. It is useless for them to debate the question. No decision can be reached by bringing in factual evidence since both have presupposed in the epistemological theory or rationalistic premise upon which

their philosophy rests that fact is of a certain character. Even if both were willing to put these basic presuppositions to the test the outcome would be no better. In the first place, it would probably be the case that both have based their systems upon premises of an epistemological character which turn upon interpretations of fact and hence cannot be checked by fact. Such philosophies are doomed to destruction on the rock of relativity since the only test for truth which they have is the consistency which deductive, rationalistic logic gives, and which a study of the logic of systems reveals to be no test of the truth of a system whatever. In the second place, if their basic notions could be checked by fact, the chances are that no decision would be reached. In this case the difficulty would be not logical but psychological. The time to determine what fact is apart from all theory about it, is not at the end of one's philosophy but before one begins to philosophize. For no matter how good one's intention may be in the end to see facts as they are apart from all the presuppositions of one's theory, the history of science shows the psychological impossibility of a human mind ingrained in theory, being able to see facts other than in terms of that theory. For example in the science of anatomy which has but to describe the structure of a dissected body, there is no doubt that the great scientist Galen had the best of intentions, but it was impossible because of his acceptance of the teleological and humour theories so prevalent in the age following Aristotle, for him to look at a dissected organism and describe accurately what was there. In spite of the scientific acumen which he possessed and the empirical method which he finally applied, he persisted in reading into his anatomical drawings, organs and humours which were not present. The philosophical presuppositions which he brought to his scientific work were too strong even for a later appeal to the empirical method to overcome. It re-

mained until the sixteenth century for Vesalius, a scientist who broke so completely from the traditional theories that he was banished by the medical profession, to give us a sound descriptive anatomy. This indicates most clearly the necessity of philosophy determining at the very outset by an intensive use of the best scientific empirical methods available, the descriptive characteristics of that which it is trying to explain.

We must conclude therefore, that instead of philosophy being restricted in its proceedure or harmed, the only way it can serve its own best interest is to pursue that scientific descriptive method which will at the same time enable it to fulfill its obligations to science.

It may be noted that a philosophy which includes the findings of science in its subject-matter has the additional advantage over other philosophies of using facts which are localized and described by those entirely independent of the theories proposed to account for them. This enables a philosopher to present a correspondence of his theory with the facts as a confirmation of his theory, for since the facts were determined and described by others, there can be no question of their being colored to fit the theory.

We have considered philosophy in its function as the special science which has as its field the general characteristics of the whole of fact. It remains for us to consider the characteristics of philosophy in its function as philosophy—or in its function as that logical discipline which synthesizes its own findings as a special science with the findings of the other special sciences. These characteristics can best be determined by considering the situation which philosophy faces when it attempts this task. It is clear that one is confronted with the conclusions of philosophy as a special science, physics, chemistry, biology, the moral and other special sciences. This tremendous mass of information is not in the form of isolated facts. If it

were, the task of philosophy would be hopeless and the objection that our program for philosophy is impractical, would hold. But instead, this mass of information is grouped into bodies of knowledge, which may be called systems. And it so happens that systems have certain characteristics in common, which the modern deductive logic has summarized for us. One of these characteristics is that all the isolated propositions which make up a body of knowledge hang around a few basic entities and relations and a few primary propositions which indicate how these basic entities and relations fit together to form the whole. Thus, instead of it being necessary for us to study and memorize all the isolated facts which make up physics for example, it is sufficient for our purpose if we know and understand the basic entities and relations and primitive propositions from which the remainder follow. We can take the physicists word for it that he has been accurate in deducing the isolated facts or propositions from the basic ones. Thus the task for philosophy becomes that of bringing about a synthesis between the basic entities and relations and primitive propositions with which physics, biology, chemistry, and philosophy as a special science provide us.

It happens, however, that the task is not quite so simple as this for within certain sciences as for example biology, there is not one system established, but three systems fighting for supremacy—namely, mechanism, vitalism, and teleology. Now if this issue should happen to turn upon issues which center in another science, for example, philosophy, or if a logical reduction of the three systems to one system could be made, we might proceed, otherwise, if we desire to reach a final philosophy we must select the system in biology which is the most probable in view of the findings of all the other sciences. There is no reason why in some cases this method should not enable one to reach

final conclusions in a special science when such conclusions could not be reached by the special science alone. It has often been the case in physics for example that some finding in one part of the science has solved a problem in another part, and there is no reason why the same thing should not happen between two different sciences. In fact, there is a special reason why it should happen in connection with a synthesis of that science with philosophy, since philosophy as a special science studies the relations and characteristics of fact as a whole, and hence the relation of a special science to the other special sciences and to the remainder of fact. The solution of certain ancient problems in mathematics when the synthesis of mathematics with logic revealed its relation to philosophy is a case in point.

But if within a special science a final reduction of a conflict of systems cannot be made, one can select the most probable solution and proceed. Providing one lets it be known definitely that it is probable and not final, no damper is placed upon scientific investigation, and great gain is attained for philosophy, for it enables one to reach a conclusion with reference to the whole of experience which is based upon the best scientific information that is available at the time.

This makes it possible for society which cannot suspend its judgment upon the major questions of existence, until the final verdict of science on every issue is in, to be supplied with conclusions resting on the best scientific evidence available. Later, if the probable synthesis made in a special science should turn out to be false, the necessary correction can be made, and the final conclusion of one's philosophy, if it is affected thereby (and it may not be) corrected accordingly. This involves no essential change from the traditional proceedure of philosophy. The only innovation involved, if any, is the suggestion that we frankly

admit the dependence of our synthetic philosophical conclusions upon scientific findings, rather than to continue in the folly of assuming that philosophers are endowed with some special method which leaves their conclusions independent of any new scientific evidence that may appear.

There is another complication which faces philosophy in its attempt to attain a synthesis of the findings of the special sciences. It is that philosophy cannot always use the findings of science in the exact form in which they present themselves. This arises because in certain cases, the kind of information in a given region which the scientist desires is different from that which the philosopher desires and the scientist puts his results into the form most suitable for his purposes. For example, Newton was interested not so much in bodies themselves as in the relations that hold between bodies. Hence the laws of motion deal primarily with relations and only secondarily with the entities involved in these relations. The philosopher on the other hand wants to know not merely how bodies behave with reference to each other, but also what kind of bodies these relations imply. To gain an understanding of the ultimate entities making up the inorganic world of the physicist he must analyze these relations into the entities implied. When one has done this with reference to the laws of motion as expressed in Maxwell's equations, C. D. Broad has shown[5] that not one, but five different types of entity are involved. This indicates that the physicist interested in the relations, has posited whatever entities are most convenient to make his equations correspond to the actual relations existing. Since he is not interested in the metaphysical question, he does not go on to determine the one consistent type of entity fitting into all these relations which must actually exist in nature. This the philosopher must do.

[5] *Proceedings of the Aristotelian Society*, 1918-19, p. 102ff.

Furthermore, when dealing with a given factor which is very difficult to measure directly, science often when another factor easy to measure varies directly with the first, substitutes in its equations this second factor for the one in question. Thus force is considered in physics as rate of change of momentum and always appears in an equation in physics in that way. Now if one in attempting to take from physics the notions which it uses, reads the equation in its literal form, one will get no inkling that physics has anything whatsoever to do with force. This error certain philosophers of science have committed. With every symbol we must be sure that we get back to what it is meant to denote. One must not mistake for the original genuine meaning of a scientific concept the entirely different meaning sometimes indicated by the literal denotation of a symbol selected solely because of practical advantages to represent that concept. It is for this as well as many other reasons that it is important for the philosopher to be acquainted with the history of science since such knowledge reveals the meanings of the concepts of science in the light of the facts giving rise to them.

One must also be critical with reference to laws or relations in science. Attempts must continually be made to determine whether a given law expresses an actual metaphysical relation, or merely a descriptive functional relation. The question arises with reference to Newton's principle of attraction between bodies. Did Newton mean merely that bodies act as if they attracted each other, in which case any one of several actual metaphysical relations might be assumed to exist, or did he mean that there was a real metaphysical force of attraction between the bodies? One must always distinguish between metaphysical relations which are irreducible and descriptive relations which are or may be reducible. The issue over teleology in biology for example, turns around this question. If the former

is true teleology is established. If the latter is true, the descriptive fact of teleology can be admitted and reduced to mechanical relations, thus establishing mechanism.

Providing then that the philosopher is careful as a result of a critical attitude to get the basic entities and relations of each special science in the light of their actual meaning, he is in a position to begin a synthesis of the special sciences. It is quite obvious that a deductive logic which enables one to deal with bodies of knowledge as a whole, and not merely with propositions of a restricted sort when they happen to fall together into syllogistic relations of threes, is very much of an asset. This logic tells us that any conclusion which attempts to account for any region of fact, be it whole or part, must state the entities and relations and primitive propositions from which the remainder follow. The task of philosophy then is to attempt to state the ultimate entities and relations, etc., in terms of which, without the use of any new ideas whatsoever other than logical constants, the basic concepts and relations of the special sciences result deductively. The moment one recognizes these precise demands which are placed upon any philosophy attempting to account for the exact information in our possession, we are aware of the utter inadequacy of ordinary philosophical conclusions. Is there any way by any skill in deduction that one can get the basic entities and relations of chemistry and physics from an ultimate real constituted of the Absolute, or of Goodness and Beauty and Truth, or of spirits in the relation of love? It is quite obvious that such conclusions account for or attempt to account for the facts of the religious and ethical experience, only by positing the ultimate real as so constituted that there is no precise reason why a single fact of science should exist.

If we turn to the process of synthesis by which such conclusions are drawn from the scientific facts of experience

we can readily see why this is the result. For purposes of illustration we will take the philosophy of J. S. Haldane since no one who has reached a synthesis has made a more serious attempt to base it upon the findings of the concrete sciences. We will assume as established so far as this discussion is concerned his conclusion as a biologist that the entities and relation of physics and chemistry are not adequate to account for all the characteristics which an organism exhibits. This means that the synthesis between biology and physics and chemistry cannot be attained by the reduction of biology to physics and chemistry. Only some system which includes some new concept over and above the physico-chemical will suffice. Now that in the organism which cannot be reduced to physics and chemistry according to Haldane is the organic relation which maintains the organism as a whole. The new category which this relation involves he terms "life." When it appears, the physico-chemical concepts fade away as ultimate concepts.* Thereupon he passes immediately to the conclusion that the concept which brings a complete synthesis between biology, physics and chemistry is the category—"life." In similar fashion he reaches a synthesis between biology and psychology by passing to the category—"mind," and a final synthesis of everything by passing through the union of psychology and sociology to the category—"group mind." Thus, the special sciences reach a complete synthesis in the categony—"group-mind" or "The Absolute." Certainly this is a "synthesis" but it is also an excellent illustration of the way that a synthesis which hopes to bring a genuine reconciliation between the different characteristics of fact, should not be made. We have noted that a sound synthesis must state the entities and relations and primitive propositions necessary and sufficient to give deductively without any introduction of additional notions, the definite

* *Respiration*, p. 393. J. S. Haldane. Yale University Press, 1922.

basic entities and relations of the special sciences which are synthesized. Now, what has happened in this case? Clearly in positing the category "life" as a synthesis of biology, chemistry and physics, he has posited a category adequate to account for the new organic relation over and above physics and chemistry but for nothing else. He has produced a so-called synthesis adequate to account for "life" or an "organic relation" only at the expense of giving no account whatever of the physico-chemical elements which enter into this organic relation, for there is no possible way in which one can get physico-chemical elements and the ordinary non-organic relations of physics out of an organic relation which is ultimate and therefore irreducible. Such a proceedure is not a synthesis at all, but merely a scheme in which one passes to higher categories only by considering certain new information and ignoring all the old. The same fallacy is committed by the epistemological idealists who having shown that something in addition to objects, namely the body of the observer, is required to account for the characteristics of fact, forthwith pretend at a complete synthesis by regarding everything as mind.

It follows therefore that philosophy in its function as philosophy or the logical discipline which attempts a synthesis of its findings as a special science, with the findings of the other special sciences, must be equipped to deal with bodies of knowledge as a whole, must be critical while possessed of a sympathetic understanding of the findings of science, and must reach a final synthesis only by stating the basic entities and relations and primitive propositions from which by careful deduction the basic notions of the special sciences result.

We may summarize our general conclusions as follows: There is a relation of mutual dependence holding between science and philosophy, which can be realized to its full possibilities only by a philosophy which will include the

findings of science in its subject-matter and take on the spirit and method of science in its proceedure. Such a philosophy will have two functions; the one, as the special science which has as its field the general characteristics of fact as a whole; the other as the logical discipline, which attempts through a synthesis of its own findings as a special natural and moral sciences, to state the ultimate entities and relations constituting the real. It may be added that this second function does not involve any fundamental distinction between science and philosophy, for every science at an advanced stage in its development attempts such a synthesis of all its separate findings. Philosophy in its synthetic function is simply attempting for the whole of fact, in an exact way with reference to its general characteristics, in a more probable way with reference to its particular local characteristics, what Euclid did for Euclidean geometry and what Newton did for classical mechanics.

If anyone still persists with the objection that such a scientific emphasis and proceedure involves too difficult a task for philosophy, one can only reply that unfortunate as the fact may be, we nevertheless live in a scientific age in a scientifically illuminated universe. For my own part I cannot regard this as a misfortune, since I am unable to understand providing one has adequate logical tools, why the increase in knowledge which science has placed at our disposal should not make it easier rather than more difficult to attain an adequate philosophy.

F. S. C. Northrop.

Yale University.

THE PHILOSOPHICAL BASIS OF BIOCHEMISTRY

THE greatest achievement of the nineteenth century," says Professor Albert Schweitzer in a recent book, "was to learn how to divorce knowledge from thought; with the result that in one mind there can now coexist the greatest technical learning, combined with a complete lack of understanding." Certainly, among all the strictures which have been passed at any time by philosophy on science, none is more true than this. The scientific worker sees only too well, existing actually in himself as well as in his colleagues, an almost unavoidable tendency to concentrate thought on the details of technique and experimental method. Of course, some men of science have accepted this tendency with joy instead of reluctance, and, agreeing to leave "unprofitable speculation" to philosophy, have reserved "facts" for science. Such an attitude, however, is singularly blind, because to evaluate truly the philosophical implications of the scientific method, one should be oneself a scientific worker as well as a student of philosophy. It is equally true that the experimentalist who regards the laboratory as the sun round which all theoretical thought should revolve is committed to a position as naive as it is unsound. Yet that attitude is still only too common among scientific men; and it marches as a rule, with many other tacit assumptions which do not stand the light of careful criticism.

Thus it comes about that among the active research workers in science, some few cannot remain content with a merely departmental outlook, but are driven to consider our position in the light of philosophical thought. Moreover, in my opinion, this is a particularly necessary proceeding in the case of biological chemistry. In the first place, biochemistry stands in the same relation to philosophy as all the other experimental sciences, because the question of the validity of the scientific method itself depends ultimately upon purely philosophical considerations. Philosophy alone can tell us to what extent the scientific method is an approach to reality, and how we may relate it to the other tracts of human experience.

But there is another reason why the biochemist especially should be careful to consider how his results fit in with those of philosophy. His central problem, the Nature of Life, is itself partly a philosophical one. And in his case this is much more than it is for the other biological sciences; for zoology deals only with the forms of animals, botany with those of plants. In physiology and biochemistry, however, we approach life in its most intimate aspect; as we pass from distribution to form, and from form to function, we become progressively less able to neglect philosophical considerations.

But now, if we are agreed that the philosophy of biochemistry has its importance, we must confess to a sense of unsatisfactoriness as we survey the present position. I was led to set myself the task of surveying it because I had observed that, whenever writers deal with these subjects they tend to fall into two distinct groups. If they are extreme rationalists or have sympathies with Haeckel's materialistic monism (much the dwindling class), they invariably argue in favor of the mechanistic theory of life. If, on the other hand, they are prepared to leave room for the non-scientific experience of man, or to allow any validity

to theology and religion, they tend to be vitalists in biology. I thus found myself with friends in both camps. Why, it may be asked, is it apparently so necessary for the biochemist to be a materialist outside the laboratory as well as a mechanist inside it? Considerations such as these led to the present article.

The first thing which is clear as we examine the situation at the moment is the opposition of the Schools of Mechanism and Neo-Vitalism. It seems to me that both are unsatisfactory but that possibly one of them can be incorporated into a more helpful outlook.

Neo-vitalism, briefly stated, is the view that in the animal body the processes of life are not, and never will be, perfectly capable of description in the contemporary language of physics and chemistry. There is about living beings an intangible something which marks them off irreconcilably from inanimate matter. A gulf, impossible to bridge, exists between that which is alive and that which is dead. The animal body is informed by some directive agency, neither mind nor soul, but which suffices to be the direct cause of life. It is surprising to note how these views resemble those of much earlier thought. Indeed, they are little else but more elaborate expositions of the doctrines of the Iatrochemists, which will repay, perhaps, a little notice in this connection.

As early as 1530, Paulus Fernelius and Thomas Argentieri were discussing these questions in Italy, and trying to define the relations between the Galenic pneumata and the vital principles of the body. But not till chemistry and physics had developed more definite conceptions could the problem reach anything like the form in which we know it today; and so we find that in the work and thought of Paracelsus Von Hohenheim, chemistry and vitalistic theory take a definite step forward together. In his lectures at Basel in 1527, he may be said to have given modern bio-

chemistry its charter, when he put forward the thesis that "the healthy human body is a conglomeration of chemical matters; when these are deranged, illness results, and nought but chemical medicines may cure the same." But although recognizing to the full that the processes of the body were ultimately physico-chemical; yet because of a certain fondness for occultism and magic which his mind always displayed, he nevertheless postulated the existence of many subsidiary souls or genii in the body. These "Archaei" directed the processes of chemical change along the lines best suited to health, and the cessation of their activity in various combinations, formed the whole of Paracelsus' pathological etiology. He developed these views later in his "Chirurgia Magna" and they exercised an immense influence during the two following centuries. For our purpose the next important figure is that of Jean-Baptiste Van Helmont, who in his *Ortus Medicinae* (1648), developed similar conceptions. He regarded the archaei of Paracelsus as struggling against rather than guiding, the chemical processes. Though quite as much of a vitalist as Paracelsus, he would have regarded death as the final defeat of the archaei by the forces of brute matter, rather than their gradual loosing of the reins of control.

The first mechanistic reaction in physiology was headed by Fransiscus Sylvius of Leyden, who, in 1663, published his *Disputationes,* a consistent physico-chemical mechanistic view of life. He accepted all Van Helmont's chemistry, but rejected the notion of archaei. In this he was doubtless helped by the *Discours de la Methode* of Descartes, which had appeared some twenty-five years earlier. Moreover, in the preceding year *De Homine Liber* had appeared from the pen of the same author; the first mechanistic textbook of physiology. Descartes, indeed, not only influenced the iatrochemical school through Sylvius, but also the ris-

ing school of the iatromathematicians through Borelli and Harvey.

After Sylvius, the pendulum swung violently back again, and George Ernest Stahl, whose *Theoria Medica* appeared in 1708, made an important advance in this problem. For he synthesized the innumerable archaei of Paracelsus and Van Helmont into one nature, the *Anima Sensitiva;* explicitly distinct from mind or soul. Indeed, it is exceedingly difficult to see in what particular the "anima sensitiva" of Stahl, differs from the various similar agencies propounded by the neo-vitalists. To Stahl there succeeded in the latter part of the eighteenth century a very strong vitalistic movement, with which we associate the names of Bordeu, Barthez, and Chaussier. It culminated in the illuminating definition of Bichat, who announced in 1800 that "La Vie est l'ensemble des fonctions qui resistent a la Mort." And now we proceed to trace in the first three-quarters of the nineteenth century a movement in favor of mechanism, supported as never before by experimental evidence of an exact kind; followed, naturally perhaps, by the neo-vitalism of the present time.

The Vitalist hypothesis, then, as it stands at the present day, is to be defined as the belief that the processes of the body are controlled ultimately not by physico-chemical laws, but by an anima sensitiva of some kind. According to J. S. Haldane, the animal body as a living system exhibits a fertility of adaptation which no constellation of purely physico-chemical phenomena could account for. For him, the continual tendency of the animal body to maintain its external and internal environment at the optimum conditions for its balanced existence, is the very kernel of what is inexplicable by physico-chemical lines of approach. He is forced, therefore, to believe in some directive power, immanent in the intact body, which guides the organism as a whole, and which cannot be studied in the separate

component parts of the animal. Hans Driesch was led to a similar outlook from his experiments in embryological fields. He found that in the developing embryo, any cell appeared to have the potentiality—until a very late stage—of developing into any other. In his *Science and Philosophy of the Organism,* he says, "Each part of the whole harmonious system possesses any possible elemental part of the unit-machine equally well, all parts of the system being at the same time constituents of different machines. A very strange sort of machine, indeed, which is the same in all its parts!" Driesch concludes that again an anima sensitiva is necessary, and to it he gives the Aristotelian name "entelechy." Other biologists have supported these views with considerable enthusiasm. Yet they have won no confidence at all among the research workers in biochemistry and physiology.

Why is this the case? It must at once be admitted that from the biochemical point of view they are profoundly unsatisfactory. Apart from anything else, none of the neo-vitalists make any real attempt to define their conception of the "entelechy." Where we long most for definition, there do we fail to find it. Many a biochemist must have echoed Philonous: "I am not for imposing any sense on your words; you are at liberty to explain them as you please. Only, I beseech you, make me understand something by them!" When we read that the entelechy is neither mind nor body, neither spirit nor matter, we are driven to ask ourselves whether it is really anything at all. "I had as lief you tell me that 'anima est angelus hominis, est corpus Dei,' as 'Entelechia'," said Sir Thomas Browne, in the *Religio Medici.* "An entelechy" says Hoernlé, "is too hypothetical a creature to command conviction. It is too obviously a stop-gap invented ad hoc. Driesch's arguments consist in pointing out lacunae in the mechanistic account, and then invoking the entelechy to fill them." We

are no better off. In fact, we are distinctly worse off; for here we probe one of these unconscious factors which has always militated against the acceptance of vitalistic theory by the biochemist. The essence of the experimental method is to isolate in a given system the factors upon which its mobility depends, and having done so, to study the influence of one of them. "Controlled conditions," that commonest of laboratory expressions, though very difficult to attain, is yet the ideal of the experimental method. But now, if among all the factors governing the systems of the animal body there is always one which we can never control; if we can ever be sure of even approaching the state of controlled conditions, then biochemistry and biophysics are only beating the air. Moreover, a just survey of the advances which have been made in those two sciences during the last half-century leads us to the conclusion that the latter alternative is assuredly not the case. We can do nothing then but conclude that the entelechy or anima sensitiva is not met with in the laboratory.

As against this there has been urged one of the most futile of all the arguments to be met in this subject. "If you ask the organism physico-chemical questions," it says "what can you expect to get except physico-chemical answers?" The only reply to this is to point out that if you ask the organism other sorts of questions it refuses to answer at all, and you have to supply your answer yourself. What happens if you ask the organism theological questions is sufficiently illustrated by the melancholy history of the Bridgewater Treatises and Paley. To get the organism to answer questions it is necessary to ask the organism and not yourself.

Now let us turn once more, for a short time, to the historical side of the problem. The most characteristic thing about the history of vitalism, if it be considered since the advent of exact methods in science, is its constant retire-

ment into more and more impregnable positions. To it can well be applied Huxley's remark about Theology: "Thus theology, having drawn itself up well above high-water mark, and being no longer in contact with the facts at any point, will be able to boast that its position is entirely unassailable."

At the opening of the nineteenth century, the vitalistic position included the view that the chemical substances in the animal organism were in some way distinct from those produced by the phenomena of inorganic nature. When Wöhler, in 1828, announced the synthesis of urea in the laboratory, it became clear that no difference existed between organic substances found in the body and those found elsewhere. Eventually it would obviously be possible to synthesize any organic substance in the laboratory, without the aid of the living body. In 1812 Legallois located the respiratory center in the spinal medulla, a discovery which gave rise to the conception of the "trépied vital"—the heart, the lungs, and the brain being the exclusive seats of the vital force. The anima sensitiva was beginning to disintegrate. After the discovery of the cellular nature of living matter by Schleiden and Schwann some ten years later, the vital force was again split up, since each cell had to be considered as living. "La Vie," said Dastre, "se décentralise." Studies in cerebral localization contributed further to the growth of the mechanistic movement, and it was immeasurably strengthened by the work of Atwater and Benedict between 1890 and 1900. These investigators, by the aid of accurate methods, and numerous experiments, proved conclusively that the animal organism obeyed the laws of the conservation of energy and of mass. It was only to be expected that the vitalism which survived these shocks should be the merest shadow of its original self.

Historically, also, we find that insofar as vitalism has not rested its claims entirely on the "argument from inconceivability"; insofar as it has not been an entirely negative belief; it has endeavored to set up some "ne plus ultra" distinction, which would include all living beings and exclude innumerable failures, and on the ruins of one wrecked definition there has soon arisen another. For example, passing over the more obvious and naive distinctions, such as that of motion, it was suggested by von Uexküll that organisms were units in time as well as in space, resembling a melody of music rather than a single note. This conception of time-factors was afterwards made much use of, "the organism," said J. A. Thomson, "trades with time." In *l'Evolution Créatrice* this thought is always present; "continuity of change, preservation of the past in the present, real duration—the organism seems to share these attributes with consciousness," says Henri Bergson.

Yet inorganic systems exist displaying not dissimilar properties, especially in the colloid state. Heterogenous systems—which form the physical basis of protoplasm—show such phenomena. As Van Bemmelen pointed out, under certain conditions a silicic acid gel behaves quite differently according as to whether it has previously been exposed to increasing or decreasing concentrations of water-vapor. Again, the tendency of organisms to return to the position of optimal environment, the "Vis medicatrix naturae," which Haldane claims as a uniquely biological fact, is surely not unlike the behavior of the gyroscope? And the principle of Le Chatélier developed in physical chemistry states that "When a factor determining the equilibrium of a system is altered, the system tends to change in such a way as to oppose and partially annul the alteration in the factor." This amounts to saying that a system is conservative and tends to remain unchanged.

Is it not possible that the phenomena which to Haldane seem inexplicable on a mechanistic hypothesis may have such a basis as this capable of being brought to light if analysis proceeded long enough?

Another supposedly unassailable definition of life is that which states that the behavior of organisms depends on their future as well as on their past. Here again inorganic systems present themselves on an equal level, for in any reversible reaction the relative concentrations of the components are determined not only by the initial state but also a final state, which is one of equilibrium.

But the most remarkable statement in the whole of neovitalism is contained in an article by J. A. Thomson in the *Hibbert Journal* for October, 1911, "Is there one science of Nature?" He considers the question whether the concepts of physics and chemistry can build up unaided "a description which will make the facts of life more intelligible." As an example of a biological phenomenon he takes the migration of the eel. "Biochemistry and Biophysics," he says, "can tell us, for instance, how the energy for the journey is obtained from the chemical explosions of reserve material in the muscles of the eel's tail. It can tell us some of the steps in the making of this fuel out of the eel's food. It can tell us that for spawning the eel requires very definite conditions of depth, salinity and temperature. And yet, does it really help us to understand the migration of the eels to the distant spawning grounds?" J. A. Thomson answers no. Apparently if we wish to understand the manner in which a motor omnibus travels from one terminus to another, it is no help to us to know the properties of petrol, nor yet the way the engine is cooled, nor even the nature of rubber tires. And let it be noted that J. A. Thomson is not thinking of a directive mind; he is confining his attention to the physical. Here we can detect without difficulty the influence of Herbert

Spencer. If we really are anxious to know the unknowable thing-in-itself, the noumenal reality behind the animal organism—the introduction of an anima sensitiva will not help us. Such a negation of the value of chemistry and physics surely bears no obscure relation to the view that the scientific method can only give us information about things, and never lead us actually to know the things. I submit that if we are really keen to "know the eel" in the mystical sense, no entelechy is the least use to us in the enterprise. Without delay we must become intuitionists. But the biochemist, nevertheless, will continue to believe that he understands the eel better when he understands the chemistry of its muscular movement.

Two more points remain in our criticism of vitalism. In the first place, Haldane alleges that, far from the organism as a whole being describable in terms of chemistry and physics, no one single function has yet received such description. We here come up against a practical difficulty, for as a matter of fact Haldane has built up his philosophical superstructure largely on the basis of the view that the epithelium of the lung can actively secrete oxygen. In this very few other physiologists agree with him. The universal opinion is that the passage of oxygen through the pulmonary epithelium is a matter of pure filtration. But apart from this, it is hardly to be expected that a complete physico-chemical description of the functions of the kidney should be arrived at first, and that the biochemists should then proceed en masse to deal with the spleen of the liver. The organism, as Haldane himself continually insists, is a whole, and its parts are so mutually interdependent that a complete description of one only would a priori be exceedingly unlikely. We must conclude that this argument is invalid.

The second point is the significant manner in which the vitalists have always laid such stress on the "argument

from inconceivability." "We cannot conceive," they say, "of a mechanism, however complicated, which should account for the observed facts. Therefore it can not exist." This argument, surely, is very easy to use, but at the same time somewhat dangerous. To found a case on the negative, and to be content with pointing out the defects in the adversary's position, is a proceeding which the theologians of the nineteenth century bitterly repented of, and which may yet lead the neo-vitalist to a similar state of mind.

I have attempted so far to analyze the reasons which have led to the rejection of vitalism by the majority of biological workers at the present day. The criticism I have given has certainly not been complete, and perhaps not very damaging, but it has at least been heartfelt. For, in common with by far the greater number of research workers in biochemistry and physiology, I see most clearly the inadequacy of neo-vitalism. In the laboratory, it simply will not do. Let us now turn to the criticism of mechanism, a theory which, as we shall see, is also by no means wholly satisfactory.

In the first place, although the "inconceivability argument," is a very dangerous one, yet it must be admitted to carry a certain amount of weight. Its use in one corner of this "Gesamtgebeit" illustrates this well. Just before the end of the last century Max Verworn, of Jena, was beginning to lead a school of physiologists very different in aim from their immediate forerunners. Whereas previously it has been an axiom that any given function could best be studied in the tissue which displayed it in its most developed form, Verworn maintained that to understand it, one must consider it as it appeared in the single cell. "General Physiology," he said, "must be cell-physiology." Accordingly, interest was focussed on to the unicellular organism, and the "animal kingdom of the physiologist, which comprised only the frog, the cat, the dog, and the

rabbit" was extended to include the amoeba. In the second decade of the twentieth century the movements which have transformed the older zoology into pure comparative physiology, were gaining rapidly in strength and among them must be counted as most important the work of Jacques Loeb. This physiologist, by means of many experiments on the tropisms of protozos, such as Paramoecium, attempted to show that all their actions could be interpreted on strictly mechanistic principles. The elements of consciousness, he thought, could be completely excluded from a consideration of their behavior. This conclusion received much support (by one of those universal tacit assumptions so common in the philosophy of science) from the numerous experiments which had been carried out on oil-droplets and other heterogeneous systems attaining equilibrium. Most of the phenomena of amoeboid movement had been successfully imitated. But in opposition to Loeb, Jennings was concerned to prove that this purely mechanistic explanation would not suffice to describe the movements of protozo. By most biologists, Jennings, in his book, *The Behavior of the Lower Organisms,* is conceded to have gained his point. At first sight this is more experimental evidence, which, like Driesch's work on embryonic development, ought to lead us to regard mechanistic descriptions as inadequate. But the point that Jennings proved was that Loeb's mechanistic theories would not work; and from his work we can draw no conclusions as to the fate of mechanistic explanations which may hereafter be put forward.

It is here that we touch on the fundamental fallacy of the argument from inconceivability. A produces a mechanistic theory to account for an observed biological fact. B says, "The theory is inadequate; we must postulate an entelechy; therefore all future explanations which dispense with an entelechy must also be inadequate." Why? On

both standpoints belief is necessary, and the choice before the scientific worker is between believing that the phenomena of physical life will eventually be intelligible in physico-chemical language and believing that an immaterial spirit, apart from mind, dwells in living matter, destined always to elude his grasp and to stultify his every effort.

On the philosophical plane the mechanistic view of life is less satisfactory. In the optimistic dogmatism which reigned supreme in the scientific world under the guidance of Tyndall and Huxley, one point was almost always forgotten. The universe external to ourselves has its subjective aspect. We only know it through a veil of word-symbolism; we deal exclusively in averages, rough approximations, and statistical laws. The individual constantly escapes us, and this inevitably because of our very sin, that of reducing the greater number of facts to the smaller number of coordinating laws. We fit the universe on to the Procrustean bed of our own intelligence. Moreover, we cannot escape the possibility that the external phenomenal world has the appearances we see it to have, solely because of the peculiar construction of our intellect. We cannot, so we are driven to feel, be assured that there is anything at all behind these subjective appearances. What there is there of the objective, if we could see it direct, and not through the spectacles of our senses and our intellect, is for us an insoluble problem; though, indeed, we usually do believe that there is something real behind the data of our senses. This general line of thought, passing through Berkeley, has been responsible for most of the damaging criticisms of the scientific method, collected together by Aliotta in his *Reactions Against Naturalism.* Ernst Mach, Milhaud, LeRoy and Duhem, have all followed out this train of thought. "Scientific knowledge," said Mach, "gains economically, but loses objectively, as its schemes become more generic and more abstract." "Physical obser-

vation," said Duhem, "is not merely the observation of a phenomenon, but is also its theoretical interpretation. Abstract and symbolic judgment is continually being substituted for description of concrete facts." Many other quotations could be made from the critics of the scientific method, but we have enough here to show that mechanistic "welt-anschauung," stands upon no immovable basis.

These views have been applied to the question of vitalism by C. D. Broad and R. F. A. Hoernlé. It requires no depth of understanding to see that if all the actions and activities of the animal are to be described in terms of physics and of chemistry, then since mind is one of those activities, the organism is being described in terms of an emanation from itself. The mechanistic hypothesis, is, after all, a conception built up upon the averages of arbitrarily-selected data, and brought into being by the pinning down into immobility of the fugitive aspects of the continually changing streams of human experience. It is just one of those conceptions which lead irresistibly to the suspicion that it owes its entire being to the peculiar construction of our own intellect. It is so that we conceive external phenomena; but if we proceed to apply the conception to the mind itself, we are explaining the substance in terms of the shadow, the living reality in terms of the dream. This criticism is indeed unanswerable; but it is not so damaging to the mechanistic view of life, as at first sight it would appear to be. For while we may fully agree that it holds as against any attempt to describe mind in the language of chemistry and physics; yet the mechanistic conception of the body remains secure. It may be that neo-vitalism and vitalism, are thoroughly unsatisfactory, but mechanism is only so insofar as it attempts to extend its domain over consciousness. In this sentence lies the germ of what is probably the best way to look at the problem at the present day. Obvious though it is, it seems to have occurred

to extremely few of the biologists of the last generation. Perhaps there has been a feeling that if we are to be mechanists as regards the body—and it seems fairly clear that we must—then we must be so also as regards the mind. No doubt the usual tendency to go to extremes accounts for this, as also for the converse fact that all the thinkers who are sympathetic towards the tracts of man's experience which we call religion and aesthetics, seem to assume that in biology they must be vitalists.

At the present day, it seems to me, the extremist state of mind is specially undesirable. In the philosophy of science we need more spirits like Desiderius Erasmus; the Luthers of the end of the last century have done their work, and what we want now is the "synoptic outlook."

Others have felt this. R. F. A. Hoernlé, prefacing his book, *Matter, Life, Mind and God,* with the remark of Plato in the *Republic,* "He who sees things together is the true philosopher," devotes much time to working out this attitude. In his view the philosopher can afford to disregard no single phase of human experience; it is useless to brush aside mysticism, poetry, morals, or science, with the easy remark that on the assumptions of the particular philosophy in question, they have no importance. "The function of philosophy," says Hoernlé, "is to stand for the ideal of thinking together the whole of human experience, taken as revealing in all its modes and forms—through what we feel and will no less than what we perceive and think—something of the nature of the world we live in." If, then, we apply these ideas to the problem which biochemistry exists to solve we find we must seek for a concept of life which is comprehensive to give ample scope for the physico-chemical basis of life at one end, and for feeling and intelligence at the other.

To do this is our problem. I have already attempted to show that for the biochemist neo-vitalism is profoundly

unsatisfactory, but on the other hand, that it is futile to extend to mind the mechanistic view of life. Accordingly we seem to be driven back to the dualism of Descartes, though we need not now accept it in the crude form of the seventeenth century. We can still adopt a monistic view of things if we believe with Spinoza, that both mind and body, spirit and matter, are aspects of a fundamental substance common to both. On this point McDougall has an interesting speculation. He suggests that the ghost-soul of primitive peoples, that shadowy quasi-material counterpart of man which was the first conception of the anima, became split up in the course of thought into two entities. One of these became the archaeus and its subsequent descendants, and the other that substrate of the intellectual functions with which pure philosophy has concerned itself. What biochemistry has done, and is doing, is to abolish the archaeus, and to return to the conception of primitive man, i. e., the undiochotomized anima. "No longer," said Hopkins in a lecture in Cambridge in 1922, "must we draw the line between living and non-living substance; but between mind and body simply." Herein lies the achievement and the aim of modern biochemistry. Upon this secure basis can begin an uncomplicated discussion of the physico-physical problem. "Vitalism," says McDougall, "has never been anything else but a form of animism, characterized by its neglect of the main problem." To this the biochemist can well agree.

Into the vast question of psycho-physical interaction, however, it is not possible to enter here; I am only too conscious of having already stepped boldly in where the angels of philosophy have feared to tread. But there are one or two things which can be safely said. "What, then," I shall be asked, "is your own conception of the animal?" Living substance, I should reply, may perhaps best be thought of as the disturbance created in the world of phe-

nomena when mind acts locally upon matter. It is the splash resulting from the sudden entry of mind into the sea of matter and energy. Apparently mind has to avail itself of certain physical conditions as it does this, the two foremost in importance being the colloidal state and the properies of the element carbon. About 1790 Gustav Reil, in his book, *Uber die Lebenskraft,* suggested that in the animal organism, the physico-chemical basis was exactly the same as in the inorganic world, but that "it was specifically conditioned by the form of living matter." What he meant by "form" is not very clear, but if for "form" we substitute the colloidal state, we see how true an insight he had. Heterogeneous systems, because of the quantitatively different part which surface energy plays in their reactions, do as a matter of fact form a different world to that of homogeneous systems, and we may thus see how it is that the familiar laws of chemistry and physics, because acting in colloidal systems take on an air of unfamiliarity. The form of living matter conditions their action. Heterogeneous systems of carbon compounds correspond to the levers and pulleys which in Descartes' famous analogy the engineer uses to move the statues in the royal water-garden. Moreover, there is a further significance to be attached to Reil's conception of the form of living matter. We regard the animal cell at the present day as an exceedingly small unit of protoplasm, containing within its membrane a whole "chemical geography" of its own. Innumerable reactions have to proceed at once, and we suppose that some few of the colloidal perticles of the cell-interior or surfaces on them, must specially favor certain of them. A. V. Hill has pointed out that perhaps we may eventually find ourselves at such a low level of size, that the statistical laws of physics may cease rigidly to hold. If we could put ourselves in the position of Clerk-Maxwell's Demon, we might see that molecules, like men, pos-

sess individuality, an attribute which both entirely lose when treated statistically. It is clear that the "form" of living matter will account for a great deal, quite unaided by any anima sensitiva.

The Cartesian conception of psycho-physical interaction (if we omit the pineal gland, that not illogical result of seventeenth century physiology) is not so far removed from that of Bergson. He regards the brain as "la méchanisme de l'insertion de l'esprit dans les choses." Since the body, moreover, as controled by the nervous system is only in this sense an extension of the brain, this view is found to correlate well with what has been said above. Alfred Lotka, in a recent article, suggests another, more detailed, view. He points out that the "fugitive condition through which matter passes on its way from one molecular arrangement to another, still remains an almost wholly unexplored field." In this state there is room perhaps for mental action. Nor is the possibility of psychophysical interaction really invalidated by the experiments of Atwater and Benedict. They were only able to prove that the law of the conservation of energy held for the animal body by experiments conducted over long periods and necessitating statistical treatment. Under these conditions, it would be very difficult a priori to assert that the influence of mind should show itself energetically, would be sure to appear. The trigger analogy has lost none of its force. "Il suffit," says Bergson, "d'un trés faible rélachement de l'amarre pour que le bateau se mette a danser sur la vague." But still, even if we desire to support the most rigid interpretation of Benedict's experiments, we have still to remember that Boussinesq showed mathematically the possibility of guidance without work done. And Lotka has shown that though we can never actually measure directly f in the elementary equation of dynamics, $f = ma$, and though we discard that term in practice; yet

it may well correspond to an objective entity having influence on the course of events in the system.

Thus we may proceed to sum up the position at which we have arrived. As a working hypothesis, vitalism is useless, for it not only fails to stimulate research, but it definitely states that biophysics and biochemistry are dealing with problems insoluble by their methods, and incapable of illumination by mechanistic principles. It is hardly surprising if such a counsel of despair has not found favor with the research worker. The mechanistic outlook, on the other hand, is only satisfactory if it reserves its activity to the body, and does not invade the mental sphere. Accordingly, it would seem as if the most satisfactory attitude for the biochemist to take up is to follow Descartes in his psycho-physical dualism, to look forward to a complete description of the phenomena of life in terms of physics and chemistry, and, lastly, by leaving full scope for man's non-rational nature, to redeem himself from the charge of being blind to the spiritual realities of human experience.

But, such a "synoptic" view is bound to repel because of its inevitable dualism. It is, after all, only the naive view of common sense. But for the biochemist it is surely the most helpful one. It is possible that we shall here be helped by the philosophy of John Theodore Merz. Among all the relative dualists his outlook is perhaps the most helpful for our purpose. The classical school of English philosophy, he considered, was immensely important in the history of thought. It was peculiarly interesting because it ended by negating itself. Berkeley had found the conception of material substance to be unnecessary; Hume had come to just the same conclusion about thinking substance, or mind. Thereafter English philosophy contented itself with the exploration of the various byways of scepticism. This Merz felt to be a wrong tendency. He continued the thought of the English school by "recog-

nizing that when the notion of substance in both its forms had been dropped, so far from there being nothing left, there is revealed an uninterrupted view of the firmament of thought, of the total contents of our individual consciousness, undistorted by the delusive notion that material substance exists, or that there is an independent entity called the self." Consciousness, according to Merz, ought not to be divided into two parts, one dealing with inner things, and one dealing with outer things; for thus we "hypostatize" both the external and internal worlds, and tend to regard sometimes one, and sometimes the other, as supremely real. Applying this to the psycho-physical problem, we can see how sometimes the body alone, and sometimes only the mind, has been regarded as the supreme reality. We are in error if we suppose that the body and the mind are ultimate categories, for they are aspects of the same thing. The "one and only reality is the firmament of the soul," and we may regard as its two chief constellations the mind and the body.

How inadequate an exposition of Merz's philosophy this is, will be obvious to anyone who knows well his writings. But its function here is to show that the crude dualism which we concluded to be the most helpful attitude as regards the biochemist's immediate problem need not be an ultimate one. The biochemist in order to be anything but intolerable in circles where the validity of man's non-scientific, non-rational, experiences is affirmed, must be a proximate dualist. But he must not fail to take the further step of relative dualism, and thus adopt an ultimate monism, though also a proximate dualism.

The only biologist of the older generation who has supported such an outlook as this is d'Arcy Thompson. In answering the question, "Are Physical, Biological and Psychological categories irreducible?" he at once granted the point with regard to psychology. But, proceeding, he

said, "I hold that one may be a consistent mechanist without being by any means a materialist. I am neither afraid nor ashamed to uphold the mechanical theory of the organism. I do not admit that in doing so we degrade our conceptions, nor belittle our notions of the organism. The mechanical concept is no base one." Such an outlook is exactly what in this article I have tried to support.

I have essayed to outline, then, an attitude towards the problem of life, which will be more satisfactory for the biochemist than most of those generally supported today. I am very conscious of the difficulty of dealing with so great problems in so small a space. But the biochemist, I believe, can go forward with confidence. In the laboratory he can say with Descartes, "The movements of the animal body follow upon the disposition of its organs, just as those of a clock follow from the arrangement of its wheels and weights." And elsewhere he can say, if he likes, with Sir Thomas Browne, "Thus there is a Piece of Divinity in us; something that was before the elements, and owes no Homage unto the Sun."

JOSEPH NEEDHAM.

CAMBRIDGE, ENGLAND.

THE CONTEMPORARY THEORY OF INSTINCT

I

IN a recent article in *Mind* (Vol. XXXII, No. 127, p. 287), on "Mental Process and the Conscious Quality," Professor Laird says: "We must conclude, then, that 'mental' series may and do occur some of whose members, at least, are without the conscious quality. This follows unless we are prepared to break completely with the usual psychological accounts of dispositions, tendencies, and similar matters." The second sentence of this passage seems to suggest that it would be a rather bold thing to perform the deed referred to, or else Professor Laird is himself contemplating such a break as being within the bounds of possibility and even as being necessary. I confess that after a fair amount of consideration devoted to contemporary theories of Instinct and to Psychoanalysis I personally feel that these theories are in need of overhauling to such an extent as to constitute almost a break with them and that there is nothing particularly bold in presenting a challenge to these theories. Such a challenge is not novel, for the hitherto prevalent doctrine of Instinct is being called in question from an increasing number of quarters.[1]

[1] Some criticisms of the doctrine are: "Giving up Instincts in Psychology," Zing Yang Kuo in *Journal of Philosophy*, Nov. 24, 1921; "The Misuse of Instinct in the Social Sciences," L. L. Bernard in *Psy. Rev.*, March, 1921; "Faculty Psychology and Instinct Psychology," G. C. Field in *Mind*, July, 1921; "The Crowd and the Herd," S. B. Ward in *Mind*, July, 1924; Review in *Nature*, July 19, 1924, by B. Malinowski of Forel's "Le Mond social des Fourmis."

I shall not attempt here to develop any theory of mind nor any consistent theory to take the place of the theories which I am criticizing. I shall simply state the nature of the difficulties which I find in the doctrines that have a considerable vogue at the moment. It cannot be denied that, on account of the bearing of a theory of Instinct upon social theory and on account of the application of these doctrines to a criticism of the existing social order, the question at issue has a certain amount of importance. The view which is taken of Instinct may lead to quite different diagnoses of contemporary social problems and to the propounding of quite different methods in practice.[2]

As a preliminary I wish to point out that an appeal to common usage is an argument that for me carries no weight. Science and Philosophy may develop such views of the universe that strictly a new terminology and a new grammatical structure might be required. We cannot now argue in favor of the movements of the planetary bodies by means of the fact that people commonly use the phrases "the sun rises" or "the sun sets." Such language is an anachronism, and language will have to conform to the facts, not facts to language. I mention this because, though psychologists are probably quite aware of the unreliability of "common usage" in psychological matters, I suspect that they have retained a good deal of popular terminology and its implications, and much psychological theory seems to be defective through fittting new facts into existing terminology instead of adapting the terminology to fit the facts. Professor Ward[3] in his *Psychological Principles,* frequently feels the need of referring to this matter. The question of Instinct is one which I think has suffered particularly from the influence of common usage. Hence,

[2] The theory applied to politics gives support to what has been called the unilinear view of social evolution. The latter, on this view, is held to be the same everywhere and to follow the same lines because of a "common human nature."

[3] Cf. p. 251.

however contrary my views of Instinct may be to common usage, I remain unconcerned. With this preliminary statement I proceed to my subject.

II

Professor McDougall's theory may rightly be regarded as constituting the basis of all later theories, even though they may be critical of it. I have found certain difficulties in it about which I have been anxious to learn whether they were due to some peculiar obtuseness on my part or whether others have shared my difficulties. I believe that I am not alone in the matter. The initial difficulty is this. Professor McDougall defines Instinct as a psychophysical disposition that is easily and uniquely prompted to activity by an appropriate stimulus; but then he proceeds to speak continually of Instinct as a mental force, as a force native to the mind, and to these forces he ascribes a very far-reaching causality in that they give direction to and color all human thought as well as action. To me—and I believe to many general readers of McDougall's work—these are two different doctrines which have no clear connection. In the second doctrine the part which the stimulus plays is ignored; the psychophysical disposition of the first doctrine seems to be transformed into Instinct as a mental force; whatever causality belonged to the stimulus is overlooked and causality is assigned to the psychophysical disposition alone. The latter is held to operate quite independently of any stimulus. This is the view of Instinct which it seems to me is then taken by most of those writers who endeavor to use the conception of Instinct as the key to social and political life and as a basis for a criticism of the present social order.

On the basis of this conception they seem to me to argue that Instincts have a kind of explosive or self-expansive power that leads to an insistent demand for expression, and that if this expression is denied them their energy will be forced into indirect and often dangerous channels. Such an idea links up with the conception of an unconscious, which in my opinion is logically necessitated by the conception of Instinct that is adopted. I believe that much of the seeming validity of the contemporary conception of the unconscious will disappear with a revision of the idea of Instinct. The Unconscious is looked upon as a region whose active inhabitants are Instincts, particularly repressed and suppressed ones. I do not wish here to be understood as denying that there may well be other phenomena which may give some justification for the conception of an unconscious; but the evidence for that must be considered on its own merits and it may lead to a different conception of the unconscious.

The term "psychophysical disposition" is to me not at all illuminating. I admit to having been at one time under the impression that in getting hold of such a phrase I had obtained a wonderful piece of information. The frequency of the use of the term "psychological dispositions" in textbooks on psychology no doubt numbed my powers of criticism, and being young I suppose I thought I understood where I was only familiar with a phrase. I do not know what the term "psychophysical disposition" covers. There is obscurity in the word "psychophysical" and there is obscurity in the word "disposition."

The term psychical as well as the term mental conveys to me no definite meaning. Professor Laird in the article I mentioned at the commencement of this paper has raised the question as to what is the defining character of Mind. So far as I am aware, in spite of the continual reference to Mind, to the mental, and to the psychical, in spite of fre-

quent attempts to label some things mental and others material, and to interpret the universe in terms of Mind, no test has been propounded whereby we can distinguish unambiguously between the psychical and the physical. In the absence of any clear and unambiguous test all our labelings and classifications are futile and based on ignorance. Hence, I do not know what has or has not been asserted in defining Instinct as a "psychophysical disposition." I do not know what qualities it is supposed to possess nor what kind or degree of causality is to be ascribed to it. These in my opinion constitute a serious objection to a statement that claims to be a definition, and as a leap in the dark is required of us, we should be sure whether such an adventure is necessary or whether a clearer and a simpler account is possible.

The term "disposition" is no doubt one that is frequently used; people refer things to a "bad disposition" or to an "active disposition" and so on. People may believe that they have explained thus a difficult phenomenon; but it is not a matter of belief but of fact whether they have done so. I contend that the term "disposition" does not of itself convey any clear meaning which justifies us in using it as an explanatory term. I maintain this contention while at the same time admitting that the psychologist, like every scientist, is free to develop such concepts as he finds convenient in dealing with his material. I hold, however, that these concepts should have definiteness of meaning and should have a solid core that withstands the dissolving effect of critical analysis. It is just in these respects that a term like "disposition" fails.

Whenever we do use the term understandingly, as for instance when we ascribe a military defeat to the disposition of the troops, we use "disposition" to signify an arrangement or order of units of some definite kind, and the effectiveness of our explanation and our understand-

ing of it lie in our apprehension of that order, or system of relations. There is not some causal factor, namely, a disposition, at work *additional* to the order and the units ordered. So far as a "disposition" is real at all, it is so as a character of an ordered set of units, and it is to the latter that causality belongs. It is further only by means of such units and their relations that a "disposition" can be defined with precision, but in consequence there is no longer any justification for interpolating "disposition" between the ordered set of units and the phenomenon to be explained. In psychology, however, the term "disposition" has been used as if it signified a self-contained explanatory factor. I consider that the use of such a term leads to failure because psychological insight depends upon the discovery of specific units of a certain kind and of an order in these units. Psychology must stop putting us off with a vague term like "disposition," and state to us definitely the specific factors that lie behind the phenomenon and the specific order in which they are placed. So long as this specific knowledge is lacking, the term "disposition" is a cloak for our ignorance.

Another term frequently used in this connection is tendency. An instinct is spoken of as a tendency to action;[4] when we speak of instincts we look upon them as so many tendencies in the individual leading to actions of different kinds. I think I am fair to a good deal of recent social psychology in believing that it ascribes causality to "tendencies." I contend that the use of the word tendency in this way leads, just as is the case with "disposition," to quite illusory explanations and that its use is quite unjustified and in fact unmeaning. We have solved nothing when we have ascribed an action or an event to a tendency. We have thrown no light upon human nature and human action when for instance we refer the quarrelling, the

[4] E. g., McDougall, *Social Psychology*, followed by others; e. g., Hamblin Smith, *Psychology of the Criminal;* Hadfield, *Psychology and Morals.*

brawling, the conflicts, between individuals or between nations to a tendency to fight or to an instinct of pugnacity. We have asserted nothing more than that they do in fact fight.

I think that the reason for the illusoriness of any such explanation is obvious. A tendency is not an antecedent to action. We require to find the factors which give rise to a tendency. If we say that human beings tend to die about seventy years of age, we certainly should not suppose that the tendency was the cause of their dying at that age. We mean that of those who have died the larger portion have in fact died in the neighborhood of that age. If we say that bodies have a tendency to fall to the ground, we do not find the explanation in a "tendency" of those bodies to do so. There is no doubt that we do speak of tendencies in this connection and that there is some meaning in so speaking. That meaning, however, is that if certain specifiable conditions are satisfied or are present, bodies do in fact fall to the ground. We no doubt ascribe tendencies to a pendulum, but these tendencies do not explain the movements of the pendulum. The tendencies themselves are dependent upon the movement, and the movement is dependent upon certain specifiable factors of a quite different kind.

We thus come to the conclusion that dispositions or tendencies are not causes capable of being used for the purposes of explanation, and that the only sense in which we can speak of human beings having dispositions or tendencies is that certain definitely specifiable factors are present. If we find in connection with human beings certain factors present, we may I think quite justifiably speak of them as having dispositions or tendencies of a certain kind. Hence, for the sake of intelligibility, we have to substitute for the terms disposition and tendency the following formula: if factors *a, b, c,* etc., are present, then an action or

psychological phenomenon characterizable as *x*, *y*, *z*, etc., occurs. The psychological problem is that of discovering the factors *a*, *b*, *c*, etc., and to substitute for them the term disposition or tendency is to evade the problem.

III

We may now raise the question where these factors are to be located. Are they to be assigned wholly to the individual, or wholly to the environment, or partly to both? Modern social psychology speaks of psychophysical dispositions, and these are located within the individual. This leads to the use of various words, such as inner, innate, mental. Instinct is spoken of as an inner, a mental, or as an innate force. That instinct is frequently called a mental force is either obscure for the reasons already urged against the intelligibility of the term "mental," or else is doubtful since it may be questioned whether instinct is mental. The observed fact which gives the securest basis for the view that instincts are mental is that impulse of which we are conscious in acting instinctively. This is, however, to place full reliance upon introspection which McDougall himself is anxious to avoid altogether or as far as possible. But even then introspection gives us no ground for believing that human action is to be explained by "mental" forces. It does not help us to decide whether or not that impulse is physically or physiologically a property of the organism and whether we are conscious of it as we are conscious of facts of external nature. Here we come face to face with a general epistemological problem of the relation of consciousness to its objects. We cannot assume without question that impulses are mental because we are conscious of them, and if they are held to be mental, it is necessary to ask on what grounds it is possible to distin-

guish their mental character and the non-mental character of the external things of which we are also conscious. In any case I contend that the obscurity of the term "mental" renders any classification impossible or worthless.

There may, however, be a sense in which instinct is inner, while yet not mental. But "inner" again is frequently taken to mean "innate" in a sense connected with the notion of being inherited. I wish to leave aside for the present the question of heredity and of inheritance. There are psychological phenomena which have features that require explanation, and the theory of heredity is one means of explanation, but I believe that it is only one and not a necessary one. I turn to the meaning of "inner" and "innate." The two are by no means synonymous. There is one meaning of "innate" which does not imply "inner" and in my opinion it is the only sense in which it can be used intelligibly.[5] It is a predicate not of a disposition or of a force within the individual but of a connection between the individual reaction and a stimulus or a situation. If a stimulus, x, is present to the individual and if he reacts in a perfectly definite way, say m, we may say that m is innate to the individual. But I should emphasize the fact that this idea of innate simply expresses a connection between antecedent and consequent. There still remains the question whether this idea of "innate" requires us to postulate dispositions or tendencies that are innate in the sense of being inner or within the individual.

I think that when we come to explain pugnacious activities by an instinct of pugnacity, angry attitudes by an instinct of anger, the acquisition of material things by an instinct of acquisition, and so on, we are getting into a muddle. We can easily understand why numerous instincts have been postulated. We observe certain very widespread, constant, and uniform activities. We have to explain these,

[5] This meaning is suggested by Strand, *Foundations of Character*, pp. 181f.

and we explain the constancy, uniformity, and universality of the activities by the assumption of constant, uniform, and universal forces that lie behind the actions and that are located in the different organisms. The tendency which is primarily a character of the action comes to be regarded as a character of the organism and as a force located in it. Hence, as we observe many different kinds of activities, it is necessary to postulate many different tendencies or forces or instincts, and we find very few psychologists who agree about the number of instincts to be postulated. It is well to recognize that there is no necessity in this explanation. Such instincts are not observed, any more than sentiments are observed as Professor McDougall himself remarks.[6] The elaborate structure of instincts, sentiments, and so on, is not a fact of experience but is imaginatively constructed by the psychologist to account for a few very simple observations.

There is no need, however, to postulate a different inner disposition or force every time that the organism acts differently. The matter can be greatly simplified by an assumption that is quite clear and intelligible and that involves no inherent difficulty but for our own theories and presuppositions. That assumption is that organisms act in different, yet definitely characteristic, ways in the presence of varying stimuli. We admit this in the case of inorganic objects, and there is no reason against admitting it in the case of organisms. An organism, represented say by *a, b, c, d,* may like any object act in the presence of x one way, in the presence of y another way, in the presence of z still another way. The same (relatively) constant set of conditions may result in different consequences in the presence of different occurrent factors. I see no reason against the possibility that on this basis many varying activities may arise according to the nature of the occur-

[6] McDougall, *Social Psychology*, p. 122.

rent conditions. The constancy and uniformity of these activities will then be explicable by the presence of and recurrence of similar stimuli. If there are certain activities which are so widespread and so recurrent as to lead us to regard them as permanent features of human or organic life, this permanency and widespread character are to be explained by the presence of conditions that are widespread and that have in fact ceased to be occurrent and have become permanent. Whether they *must* be present permanently or even at all is another question.

In the meaning which I assign to "innate" emphasis is put upon the stimulus on the one hand and upon the act of the individual on the other. The problem of the nature of instinct turns essentially upon the connection between the two. The point in which I differ from contemporary psychology is that I see no need to interpolate a mental force between the stimulus and the act. The term instinct as an inner force leading to action ceases to have meaning. If the word "instinctive" is still retained and applied to action, it signifies an action that takes place directly on the presence of a definite kind of stimulus without the intervention of reflection. We have simply to recognize the fact that such actions do take place. In saying that instinctive action implies a direct relation between stimulus and act I mean to rule out psychophysical dispositions, tendencies, impulses or any other mental factor as sole causes or even as intermediate conditions of the act. I deny the need of postulating a psychophysical disposition to rouse which is the function of the stimulus and which in turn is the direct cause of the action. On the other hand, I am still prepared to admit that we require to conceive that the stimulus and the act are somehow linked up and that the organism is the medium through which this linkage is effected. To trace in the organism the path by which the two are linked constitutes an interesting and an important problem.

But as the physical scientist can from the quality and temperature of two glasses of water calculate the quantity and temperature of the resulting mixture, although he may not be quite sure of the intermediate steps whereby the resultant temperature is reached, so it is possible to maintain that in instinctive action stimulus and act are directly dependent although we are not sure of the intermediate steps. I hold, however, that the latter are physiological. In contemporary psychology there is a good deal of controversy as to whether certain mental factors condition instinctive reactions. I recognize the difficulty of the question and do not wish to be dogmatic. But personally I am inclined to hold that emotions are not conditions of instinctive acts; nor am I by any means convinced that consciousness[1] is a condition unless we are prepared to give some meaning to consciousness which will justify us in ascribing it to the lower animal forms and even to plants.

In this sense of "innate" the significance and importance of the distinction between instinctive and acquired actions no longer will justify us in ascribing it to the lower animal forms and even to plants.

In this sense of "innate" the significance and importance of the distinction between instinctive and acquired actions no longer hold. Every act has its conditions. The distinction was made on the assumption that instincts were inner forces native to the organism and that they compelled the organism to act in specific ways, while many other ways of acting were dependent on experience of certain factors. From my point of view an "acquired" action is just as innate and native to the organism as an "instinctive" one. If it were not, it is difficult to see how it could ever in the first place be performed and so "acquired." That they are

[1] The important question here is, consciousness of what? There is not always consciousness of the action; this fact has been recognized in the comparison of instinct to habit. Does "stimulus" imply consciousness of, e. g., danger? If it does, what is its degree? Frequently people act in an instinctive manner, and then wonder what was the matter.

acquired must mean that, given certain conditions, an organism acts in a specifiable manner, and this is the general formula for all action. The distinction between instinctive actions and other actions turns upon the kind of stimulus and the presence or absence of other determining factors, such as ideas. The failure to reach agreement about the number of instincts is I think to be explained by the obscurity, even invalidity, of the distinction between innate and acquired tendencies—a distinction which all attempts at enumerating the instincts presuppose. Civilization insofar as it means control over nature, the elaboration of mechanisms on the basis of that control, and the results brought about by the working of these mechanisms, retains from a more primitive stage conditions that operate as stimuli to action, indeed that operate in an intensified form, and at the same time brings into play new conditions that give birth to new stimuli. I think that the recognition of this will throw light upon the difficulty of enumerating the instincts and of deciding whether two actions are different or whether they belong to the same "instinct."

IV

I have so far considered the meaning of "innate" and endeavored to show in what way it differs from "inner." It is now necessary to consider the latter. It is quite clear that the individual has a nature that is a determining factor in an instinctive reaction. For this reason all the factors that have a bearing on the question of instinct are not to be sought in the environment alone. The constitution of the organism is an important factor. Hence "inner" elements have to be recognized. What the respective importance of the internal and the external factors is, however, a matter so difficult to determine as to be impossible

and in any case it would be fruitless. What is important is to get some idea of the kind of factors that are determinative on the inner side.

The consideration of this question and hence of the question of instinct has, in my opinion, been limited too much to the animal series. I see no reason against including the plant series as well, and in fact such an extension of the sphere of enquiry is absolutely essential. In the higher members of this series at any rate we find two fundamental types of activity which are common also to most members of the animal series, namely, those connected with nutrition and sex. I am aware, of course, that there is some doubt as to whether sex is or is not an instinct. It certainly seems to be different from what are generally recognized as instincts, for whereas the latter are held to be stimulated by an external factor the former seems primarily to be dependent on physiological, and hence on chemical, changes in the organism itself. Yet just in this respect it seems to be most entitled to the name of "instinct" as that term is employed in current literature. Sex-activities are prompted by inner forces arising from the general make-up of the organism. Thus we find that sex (and the same is true of nutrition) seems to be and not to be an "instinct." I think that this contradiction and hence the controversy over the question are simply due to the ambiguous and obscure nature of the prevailing definition of instinct.

We do not very commonly hear about the sex-instincts of plants. I doubt very much whether we would throw any light upon the reproductive activities of plants by ascribing them to an instinct, and I should hold that these activities are capable of explanation on purely physical lines. Yet these activities in plants and animals have striking similarities. The main differences are, first, the fact of local movement in animals which is apparently and gener-

ally held to be prompted by instincts; second, the presence of a conscious element in animals or in some of them, certainly in man.

As regards the first, we are aware how animals frequently go in search of the object in which sex finds satisfaction, but I believe this should be ascribed to other conditions of their type of existence and not to a sex-instinct. It is not in my opinion a difference so fundamental as to justify us in assuming an instinct in the case of animals and not in the case of plants which depends upon external factors like wind and insects to bring the pollen into sufficient proximity to the ovaries to facilitate fertilization.

As regards the second, we can not assume that consciousness is essential, for in face of the fact and of the question at issue that would be begging the point. A study of comparative psychology soon shows us the great difficulty of deciding the extent of consciousness in the organic series. So far as I am aware, no unambiguous test of the presence or absence of consciousness has been devised. In the organic series we come upon activities that seem equally explicable on mechanical principles or on the assumption of consciousness. It may be held that the whole series below man is to be interpreted as being endowed with varying degrees of consciousness; but any such assumption is worthless unless we are quite clear as what consciousness does in the matter. What is essential is an independent enquiry into the nature of human action and thus into the relation between the factor of consciousness and the physical principles involved in such action. We must first be quite certain of the role fulfilled by consciousness where consciousness is admittedly present, and I do not think that it is at all clear that that role is a causally determining one.[8] I mean to suggest that the relation be-

[8] I mean with reference to sex and the "instincts." I am prepared to admit that consciousness is a determinating factor in deliberate action. The latter is for that reason non-instinctive.

tween consciousness and the basis of our own action may be the same as that between our consciousness and the basis of the movement of any external object, say a piece of wood floating down a stream. The urge or the impulse which is so characteristic of sex (and of instinct in general) may have its basis in the physical nature of the organism; that is, it may be an urge of the physical organism and hence may be physical itself in character; and some organisms may be simply conscious of it. There is no prima-facie reason for believing that the urge or impulse is to be predicated of an entity called consciousness. If we admit that sex-activities in plants are not dependent on consciousness but are due to chemical and physiological conditions, we have no reason for holding that some additional factor is necessary to account for activities that are in man fundamentally the same.

Thus in the case of sex (and the same applies to nutrition) the conclusion is that certain activities are due, not to some force called an instinct but to some definite factors, *a, b, c,* in the organism, and that so far as it is justifiable to speak of a "tendency," or of a "disposition" in the organism, such a tendency or disposition is not additional to the factors *a, b, c,* but is a property of them. Even in the case of sex (and nutrition), however, the internal factors are not all the factors that are relevant. It is frequently assumed that the organism is a type of self-contained whole which effects all its changes from within itself. This is so far from being the case that the higher the organism the more delicate it is and the more is it at the mercy of external forces. We tend to ignore this fact, partly because we are apt for purposes of simplification to take environmental conditions for granted, partly because of the subtle influence of many of these factors. Food, soil, economic and housing conditions, the condition of the

air, climatic conditions, are all factors that might be shown to have a bearing on sex.

V

I now come back to a consideration of the general formula which is valid for all action. It is: if factors *a, b, c,* are present, then an action or a psychological phenomenon characterizable as *x, y, z,* occurs. An examination of the fact of sex (and nutrition) leads to a differentiation of factors within the antecedent of this formula. The formula becomes: if internal factors *a, b, c,* and external factors *l, m, n,* are present, then an action or a psychological phenomenon characterizable as *x, y, z,* occurs. This simply implies that it is impossible to separate the organism from its environment, that the organism and its activities are what they are because the organism has developed within an environment of a definite character. Human action, human thought, and civilization grow out of both sets of factors—internal and external, and hence the view that instinct is a disposition or an innate tendency which is the causal basis of all human thought and action must be rejected.

The preceding formula is valid not merely of sex and nutrition but of what are definitely spoken of as instincts, and at the same time it can be used to throw light upon the distinction between the latter and the former. In the case of sex and nutrition an external stimulus, in the sense in which it is used in connection with, say pugnacity, plays a role that is comparatively unimportant in comparison with its role in the other instincts. The sight of food or of a member of the opposite sex does not rouse "instinct" unless there is "appetite." The external factors which I have suggested as relevant to sex and to nutrition are not

a "stimulus" in the sense in which stimulus is used in the case of anger or pugnacity. For these reasons there is ground for distinguishing sex and nutrition from instincts like anger, pugnacity, etc. If a very general view is taken and certain qualifications are omitted, the difference between the two might be expressed in the following way: in the one case the internal conditions are continuant while the external are occurrent, in the other case the external conditions are continuant while the internal are occurrent. This distinction, I say, is only very general, because it assumes the questionable fact of the absolute rigidity of sex-activities and of conditions of sex, and because the difference between "continuant" and "occurrent" is not absolute but is simply one of greater and less. I contend merely that wherever we find continued uniformity of activity there we will have to postulate and search for a set of conditions that have a relative degree of persistence.

The formula itself is only general and does not itself serve to distinguish between the various activities. Such distinction can be effected only by empirical investigation which will substitute specific factors for the symbols. This is fairly clear in the case of sex and nutrition, but it is not so clear of application in the case of the generally accepted instincts. The difficulty lies in assigning the internal factors, *a, b, c,* in their case to some definite types of fact, seeing that I have rejected such factors as innate dispositions and forces. I have maintained that in their case the internal conditions are to be regarded as (relatively) continuant. I am therefore assuming that the organism of any definite type is (relatively) fixed in character. The latter consists of the structure and constitution of the organism and the primitive activities of sex and nutrition arising out of that structure and constitution. It is obvious that, as many important instinctive activities involve local movement, structure is a relevant condition for such

activities. As many instinctive activities are prompted by obstacles, it is obvious that some more primitive activities lie at their basis. I contend that such are the factors that constitute the internal side of "instinct," and that there is no need to postulate some "inner" factor in addition to these. Some persons may feel a difficulty in understanding how an organism, viewed in this way, can react now in one manner, now in another in the presence of varying stimuli; but this difficulty is not lessened by interpolating dispositions or some other factor between the action and the stimulus. The same problem of transeunt action is present in both cases.

VI

I shall now draw attention to some of the consequences of the preceding argument. Since I deny the existence of instincts as forces, I do not feel the need of postulating an unconscious in which they are to be located when they are repressed or suppressed from consciousness. I have already a locus for all the forces which I believe to be necessary for explaining human action. (I do not mean that they are all known.) That locus is the organism and the environment. To ask, where does the instinct go when it is not in operation or is not allowed to operate, is for me as meaningless as to ask, where does our walking go when we are not walking. In another respect it is as meaningless as to ask where does the chair go when the room becomes dark. In the one case there is nothing for which we have to find a locus; in the other the locus remains what it was—namely, the physical room. So, when we are not acting instinctively there is no instinct for which we have to find a locus, and the factors which previously formed the conditions of the action remain where they always have

been, though not necessarily in the same mutual relations.

The consequences for social theory are equally important. Contemporary social psychology leads to the hypothesis that social unrest is due to the suppression of fundamental instincts in the great mass of the people. The economic structure is criticized from this standpoint, and the remedy suggested has in view the liberation of these instincts. As I do not accept the doctrine of such a permanent human nature made up of various instincts, I do not consider the diagnosis nor the remedy sound. There are in my opinion no "instincts" to be liberated. Much contemporary social theory based on the psychology of instinct loses sight of the fact that, even though there were instincts, the mere fact that they *are* is not a sound basis for the argument that they *ought* to be given play. My own view takes another direction. The point which I want to emphasize is that the elimination of certain actions does not imply the relegation of some instincts to an unconscious where they become a continual menace to the peace of mankind. There are no instincts to be repressed. Actions are to be eliminated by eliminating some or all of their conditions, and there is no ground for believing that the removal of those stimuli that make men pugnacious or angry, etc., will do human beings any harm. I think that source of the social unrest and nervous disorders is to be found in this fact: in our modern civilization we continue to suppress numerous activities while leaving the stimuli that prompt to these activities to continue operating without restraint. The consequence is psychological conflict ending in nervous disorders and even in ultimate collapse, and the remedy is to overhaul modern conditions and attack undesirable activities through an attack upon the offending stimuli.

Finally, in what sense do our instincts give direction to and color all our thoughts? We have seen that there are

no "instincts" to prompt our actions, and there are none to underlie our thoughts. I do not think that Professor McDougall makes clear the way in which instincts do exert on thought the influence which he ascribes to them, and in my opinion the anthropocentric feature which one would expect in human thought if it were so is not to be found. Sex and nutrition have a fundamental significance for human beings, and there is no doubt that activities and objects connected with them have a peculiar interest for mankind. A great deal of social belief, tradition, and organization have their basis in the facts of nutrition and sex. But while admitting that, I find it difficult to understand the sense in which instinct colors our thought. I consider it equally true that our thought is colored by the world of external nature and follows a direction set by it. Sex and nutrition are two facts out of innumerable other facts. The activities of sex and nutrition have been largely determined by thinking about these other facts. I believe the case to be that our instinctive activities, being a response to certain stimuli in the environment, have served to direct our attention more fully to those stimuli, and thus the objects to which we attend and of which we have gained most knowledge are those which are connected with "instincts." That is the only way in which instinct is related to thought so far as I can see. After our attention has once been directed to certain objects, our thought follows the nature of the objects, and in doing so it comes up against every fresh stimuli which prompt thought onward in its never-ceasing quest.

B. M. LAING.

UNIVERSITY OF SHEFFIELD, ENGLAND.

TIME AND HEREDITARY MECHANICS[1]

WHEN a new scientific theory makes its appearance, it frequently sets up in our general ideas a sort of whirlpool which seems as though it would shake the very foundations of science. Then, after a time, things become separated off and classified. We discover that the scientific universe has not been overthrown, but that some one special truth has merely been added to truths already known. Whereas the scientist is exclusively interested in this new and precise fact that has been added to the groundwork of our knowledge, the attention of the philosopher, who is of a more romantic temperament, is attracted in particular by the mental perturbation of which we have just spoken.

We should like to examine a recent theory which can be traced back to experimental facts that have long been known: "hereditary mechanics." In certain important aspects, this theory would seem to clash with the classic ideas of science; it has awakened discussion and has partisans and opponents of its own; in a word, it has brought about that disturbing element in our conceptions to which we have alluded.

Were we addressing ourselves to a strictly scientific public, it would be unnecessary to mention Vito Volterra's admirable work along these lines. Strange to say, how-

[1] Translated by Fred Rothwell from the *Revue de Métaphysique et de Morale*, January, 1916, Vol. XXIII, pp. 268-276. We are printing this translation of M. Winter's admirable volume of Volterra's work in view of the growing importance of that work in mathematical physics. [Editor.]

ever, philosophers, in France at all events, do not seem to have been disturbed in any way by these new ideas. Consequently, before formulating any remarks on the conception of hereditary mechanics, we think it will be useful briefly to sum up the facts at its basis and summarily to describe the mathematical forms by means of which we may now enter upon the theoretical study of these facts. In contradistinction to the method followed in mathematical works, we will begin with a very simple description of the experimental facts on which the theory is based. And, that our purpose may be known, we will immediately give a definition by Emile Picard which will govern our own *exposé*: "Supposing[2] *that the future of a system depends at any given moment only on its present state,* or, speaking more generally—if forces are regarded as possibly depending also on velocities—that this future depends on the present state and on the infinitely-near preceding one, we have formulated a principle of *non-heredity.* This is a restrictive hypothesis. . . . Numerous are the instances in which the future of a system seems to depend on previous states: here we have heredity."

The non-hereditary point of view has been formulated by Paul Painlevé with considerable precision: "To foresee its ulterior states [of a body], it is enough to become acquainted with its initial conditions at the instant considered, without knowing how it has been brought to this state."

It is needless to indicate problems in which the future of a system depends only on the present state; such are the well-known problems which immediately present themselves to all minds: as, for instance, the calculation of the movement of a projectile in a vacuum, the initial conditions being given.

[2] *Rivista di Scienza,* 1907, No. 1.

Mechanical and Physical Facts in which there is Heredity

We will describe only a few facts as examples; for further details, we refer the reader to treatises on physics.

Flexure.—Here is a well-known fact. If to the extremity of a horizontal elastic bar, the other extremity of which is fixed, we hang gradually increasing weights, then if we diminish the loads (the weights passing backwards through the same values), the bar, *in the case of one and the same weight,* on going (at the loading operations) and on returning (unloading operations) does not show the same flexure. "The present deformation does not, then, depend on the present load only, but also on all the previous loads. . . . It would consequently seem possible to enunciate the principle that all action that takes place leaves a remembrance in the body which thus retains the memory of all the loads it has borne." [3]

Curve of Traction of Rubber.—Here is another instance we borrow from Bouasse;[4] the experiment indicated is extremely simple: it refers to the curve of traction of vulcanized rubber. "Imagine suspended to a rubber cord, say, five millimeters in diameter, a pail in which we unroll a chain at a uniform velocity. We register the length L of the rubber cord on a cylinder turning at a uniform velocity; we thus describe the curve of traction at velocity of constant load. . . . On reaching a point B which corresponds to the load P, suddenly reverse the motion of the chain. . . . Thus we describe a return curve which is not superimposed on the first curve: and we have hysteresis."

[3] Volterra, *Fonctions de lignes,* p. 213. Here is a practical application: an old metallic bridge does not get out of shape when a load passes over it so much as does a newly-constructed bridge.

[4] *Cours de Mécanique physique,* 2nd edition, p. 176.

Torsion.—Along the same line of thought, we would also refer to the experiments of Weber, Wertheim, and Kohlrausch,[6] relative to hysteresis in phenomena of torsion.

Magnetization.—We would also point to the case of hysteresis in the phenomena of magnetization. Suppose we are dealing with a bar of iron subjected to a magnetizing force. We mark down as ordinates the values of the magnetizing force, and as abscisse the intensities of magnetization. As in the phenomena of flexure, traction and torsion, we have an outward curve and a return curve; the outward curve corresponds to the increasing values of the magnetizing force; the return curve to the decreasing values of the same force. Here, also, the outward and return curves do not coincide, and we have hysteresis: for *one and the same value* of the magnetizing force the intensity is greater in the descending period than in the ascending period. This clearly proves that intensities of magnetization depend not only on present states but on previous states. These instances of hereditary phenomena will suffice.

Mathematical Algorithm Applied to Hereditary Phenomena

We have long been without any mathematical instrument enabling us to enter upon the study of hereditary phenomena. It is known that Volterra has filled up this gap and that his discoveries along these lines are connected with that magnificent development of modern analysis which goes under the name of the "functional calculus." Integral equations, and above all integro-differential equations and systems of such equations will enable us to solve problems

[6] *Cf.* Violle, *Cours de physique*, I, p. 438.

dealing with hereditary mechanics and physics. Here, too, we will confine ourselves to a few examples:

Hereditary Elastic Torsion (statical problem).[6]—We know that, as a first approximation, the relation between the moment of the couple of torsion P and the angle of torsion ω is given by the equation

$$\omega = KP, \tag{1}$$

where K is a constant which depends on the nature and form of the body subject to torsion. "Now, strict experiments show that ω does not depend on the present moment of torsion only but also on the preceding moments; under this aspect the phenomenon is hereditary." Suppose that heredity previous to the instant t_0 is negligible; if we wish to take account of heredity starting from we must replace the equation (1) by the following equation

$$\omega(t) = KP(t) + F\,|\,[P(\tau)]\,|, \tag{2}$$

t_0 and t being written below and above the second P.

The second term of the second member represents a function of lines following the notation of Volterra, which we suppose to be known. Granting that the function F is capable of being developed in an integral series, we have an equation in which, if all the terms are negligible with respect to the linear terms in P, becomes:

$$\omega(t) = KP(t) + \int \Phi(t,\tau)\, P(\tau)\, d\tau, \tag{3}$$

where the integral is taken between the limits t_0 and t and $\Phi(t,\tau)$ is called the "coefficient of heredity." The integral represents the total of all the residua due to the preceding operations. The moments of the couple of torsion P therefore is calculated in the hereditary statical case by solving the integral equation (3) of the second kind.[7]

[6] Volterra, *Leçoss sur les équations integrales et intégro-différentielles*, p. 138.

[7] In phenomena of flexure, we would have an integro-differential equation of the fourth order.

Hereditary Elasticity.—The theory of elasticity has for its object the study of the deformations which bodies undergo when acted upon by external forces. When the forces are so small that the deformation may be regarded as infinitely small, the deformations are connected with the strains by Hooke's law which we may state.

We need not explain how the partial differential of elastic equilibrium in the non-hereditary case are to be obtained. That Hooke's relations show that deformation depends solely on *present* strains is what interests us. If we would take previous "actions into account we must correct the formulae" by adding terms that depend on all the values of the tension, which have been exerted on the body. Thus we take heredity into account, since then the present deformation does not depend on present actions alone, but on the entire history of the strains made on the element under consideration." [8]

By using Hooke's relations transformed in the manner indicated we reach the equations of elastic equilibrium. Whereas in the non-hereditary case, however, the equations of equilibrium were common partial differential equations, in the hereditary case they are integro-differential equations.

We refer to Volterra's work for the study of the integration of these integro-differential equations.

Acoustics.—The theories of non-hereditary or hereditary elasticity are of a very abstract character; the following is a far more concrete instance given by Volterra at the end of his work.

The problem to solve was as follows: What is the best material for making tuning forks? In this problem in acoustics a large portion of the vibratory energy is not used for the emission of sound; it is absorbed by the vibrating body. Two principal theories were face to face with each

[8] Volterra, *Fonctions des lignes*, p. 92.

other: the theory of viscosity and the hereditary theory. Webster and Porter, two American scientists, endeavored to solve the problem. Now, whereas the theory of viscosity gave results contradicted by facts, the theory of heredity was confirmed by experience (the investigators used an integro-differential equation of the fourth order). Volterra also extracted the general principles of the hereditary theory. We shall give only very general indications on this most interesting point—one, however, that would carry us away from our subject:

"In this connection[9] we refer to a postulate and a general principle to which all phenomena of heredity are subject. The postulate is that of the dissipation of heredity action. According to this postulate, all hereditary action disappears in time; the principle is that of the *closed cycle*: if to every periodic action there corresponds a periodic effect having the same period, the laws of heredity do not change with time, and *vice versa.*"

Philosophical Considerations Relating to Hereditary Mechanics

We will now deal with the difficulties and objections raised by the conception of hereditary mechanics. It must not be imagined that the discussions to which we allude are merely an unproductive game. They prevent scientific thought from crystallizing. And even if the controversies of which we are about to speak had no other purpose than to clear the way and make it fit for the passage of new ideas, the part they play would still be a most important one.

Paul Painlevé, a famous geometrician, has formulated as follows[10] his objections to the conception of hereditary

[9] Volterra, *Fonctions de lignes*, p. 220.
[10] *La méthode dans les sciences*, p. 114.

mechanics. "The state of a material body at any given moment manifestly depends on the previous circumstances through which it has passed. To foresee its ulterior states, however, it is sufficient to know its initial conditions at the moment under consideration with knowing how it has been brought to that state. . . . All the same, in numerous applications and in particular when the *molecular* state of the bodies is an appreciable element in the phenomena, it may be very difficult, even impossible, for our experimental technique to determine directly with adequate precision, the initial conditions of a system. . . . The *history* of a body (like the list of displacements from zero in an accurate thermometer) is a help to the present incapacity of our technique. This is a necessary stage in the molecular study of bodies, but it is no more than a stage, and we must take care not to deduce from a temporary method conclusions alike hazardous and unjustified; more especially, we must not contrast it to the Copernican doctrine. The conception according to which a prediction of the future of a material system would require a knowledge of the whole[11] of its past, is the very negation of science."

It might at the outset be objected that there is no absolute type to which every mechanical explanation of a phenomenon should be related. The words "explanation of a phenomenon" are devoid of precise and invariable meaning. The meaning of this expression has expanded, as, for instance—giving, of course, no more than analogical importance to the comparison—has that of the idea of the solution of an algebraic or differential equation. In the case of an algebraic equation of the fifth degree, the expression "to solve the equation" has not the same meaning (Hermite's theory) as when we are dealing with equations of the first four degrees. We also know that when a differential equation can not be integrate *formally*, it must

[11] As we have seen, it is sufficient to go back in the past to an instant t_0 and not to $t = -\infty$.

yet be regarded "as integrated if, by any process of indefinite approximation (series, continued fraction, definite integral, etc.) we arrive at representing the general integral in its entire domain of existence with as small an error as we wish, the representation putting into a clear light the fundamental properties of the integral." [12] In like fashion, the meaning of the expression "to explain a phenomenon" has become transformed with the development of science. The principles of the classical mechanics, for instance, have been upset by the relativist theory. The statistical conception, the full importance and scope of which were shown by G. Castelnuovo in an article that appeared in *Scientia*[13] some years ago, should also be taken into consideration. Consequently, there is not merely a single type of explanation of a physical phenomenon; there are several.

Amongst the possible types of explanations our choice is not an arbitrary one, it is mainly imposed upon us by the nature of the facts investigated. In these conditions, it may not appear legitimate to reject the new mode of explanation, the hereditary explanation, because it is not conformable to the reasonings of the classical mechanics. Speaking of the non-hereditary conception, Picard has said that "it is a restrictive hypothesis and is contradicted by many facts." [14] To dismiss the hereditary explanation *a priori*, it would have to contain within itself a sort of logical vicious circle from which the other methods are free. Now, this does not appear clearly. Probably we shall never be able to construct ultra-microscopes so powerful as to give us complete and definite information as to the ultimate molecular state of bodies. So far as we can prophesy, we may say that we shall always be faced with problems of the hereditary type. These problems, we are told, are at pres-

[12] Painlevé, *Bulletin des Sciences mathématiques*, Vol. XXVIII.
[13] *Scientia (Rivista di Scienza)*, Vol. IX, 1911.
[14] *Rivista di Scienza*, 1907.

ent of the hereditary type, but, once our experimental equipment becomes improved, it will be possible to deal with them by non-hereditary methods and to determine the initial conditions with the requisite precision. The hereditary method, then, is but a transitory one. But in what domain of physics are the methods not transitory? And how can it be otherwise since a physical law is never anything but an approximation? Volterra has tried to give precision to the reasons for which Painlevé seems to wish to dismiss the hereditary methods or at least to use them only as chance means. It would seem, according to Volterra, that this is because the hereditary theory implies a kind of action as a distance in time, analogous to that of Newtonian forces in space, and the idea of action at a distance is one that many seem unable to grasp. For the present, it is known that *practically* there are problems, e. g., astronomical problems, in solving which we cannot ignore Newtonian forces. The Maxwellian conceptions (explanation by means of an intervening medium), when dealing with such things, culminate in inextricable difficulties, as everyone knows. Hereditary methods may, then, be inevitable in certain problems just as the Newtonian point of view is inevitable in astronomy.

For the peace of philosophical consciences, it would always be possible to say that things took place "as if" there were actions at a distance. Perhaps the "as if" is but a logical artifice: the practical superiority of the methods which infringe upon certain philosophic conceptions might be due to reasons which elude our notice and would permit of their justification from the theoretical point of view. We may go further, however, and ask the opponents of action at a distance whether they consider action through a medium to be perfectly clear. In this latter conception, on the molecular scale, do we not meet with certain of the dif-

ficulties which the theory of action at a distance encounters on the visible scale?

At all events, we regard it as interesting to call the attention of philosophers to this introduction of heredity into mechanical phenomena, and to see how it fits in with some particular philosophical theory, the Bergsonian for instance. And lastly, there is a hypothesis which can be connected with the ideas we have set forth, and which may be pregnant with future discoveries. This is the hypothesis formulated by Volterra, though with the utmost caution, when he says that the mathematical method which, in future, will probably be the one best adapted to the study of biological phenomena, will be of the type of the functional calculus. Now, certain philosophical prejudices, as, for instance, the conception according to which physical and biological facts are radically heterogeneous, might deter enquirers from these studies and postpone the application of the preceding hypothesis. We know that a certain implicit philosophy guides the scientist, if not when endeavoring to solve problems that are clearly stated, at least in the choice of the problems he sets himself, and it is the postulates of this implicit philosophy that it would be interesting to set forth and criticize. This would no doubt throw light on the foundations of a theory which will some day form one of the principal chapters of natural philosophy.

MAXIMILIEN WINTER.

PARIS, FRANCE.

FOSSILS OF THE MIND

I

THAT the present age is one of critical examination, in which social, educational, and moral concepts are being scrutinized and revalued is an observation so trite that only a purveyor of ethical platitudes would be guilty of recording it. Nevertheless, the sweep of this intellectual reconstruction is so broad in its scope that not only have religion and biology been swept from their secluded moorings, but even the field of physics can no longer hope to preserve immunity to the virus of scepticism which is attacking all hidden premises and unexamined assumptions. Such, in mixed metaphors, is the chaos of ideas we now survey. From a more theoretical viewpoint the most disturbing eddies in the stream of modern thought, which are agitating most profoundly the current of ideas, are "psychoanalysis," "behaviorism," and the "theory of relativity." No doubt the more ambitious philosophers, who strive to attain that synoptic vision which Plato held should constitute the perspective of the spectator of all time and all existence, will rush in, where the more circumspect scientist fears to tread, and claim to discover some unifying principle underlying and harmonizing these seemingly unrelated movements. This, of course, is always the prerogative of those whose avowed mission is that of presenting a "synthesis of the sciences." But whether there is any fundamental concordance between movements separated

by the wide expanse between the field of physics and the province of psychology remains for the future to reveal.

In any case, the merit of the present conflict between the older traditional conceptions and the newer and more revolutionary notions is that these more recent ideas serve as catalytic agents agitating a solution which is otherwise always on the point of coagulating into that inflexible system of beliefs and creeds which has been called the "cake of custom." Such a state of stagnation and immobility is nothing less than a symptom of intellectual fossilization, a condition which the pessimistic intelligentsia have always feared is about to materialize. Indeed, protagonists of the intellectual aristocracy, summoning to their aid all the newly discovered methods and marshalling the statistical data and hasty generalizations of the youthful but lusty psychological and social sciences, now proclaim in no feeble utterances the oncoming decay of the social order, the twilight of civilization, which, they believe, will inevitably follow the intellectual anemia and mental atavism which must accompany the gradual extinction of the superior Nordic stock here in America.

I shall not be so presumptuous as the philosophers and social scientists. My present task is the modest one of attempting to establish the thesis that if it be granted that psychoanalysis and behaviorism (whatever their differences may be) have in common the ideal of establishing a monistic or biological conception of personality, then, thus linked together, they provide the basis for a new psychological science which one student has already designated as paleo-psychology. This science, studying the fossilized forms of mental evolution in a fashion analogous to the study of paleontology, which investigates the structures of ancient and extinct animals, differs from its sister science in that it does not limit itself to the fossilized forms of human thought of past ages, but also studies existing types

of thought structures regarded as survivals and reconstructions of more primitive systems of belief. Paleo-psychology thus includes the comparative anatomy of ideas.

This science begins its studies with the dawn of the mind, when the penumbra we call "consciousness" lighted up the pathways of the central nervous system, and intelligence, as foresight of the ends to be attained, guided the previously unconscious modes of response of the lower organisms. This way of viewing our ideas is so novel, and perhaps repugnant, to our natural human prejudices, that one may anticipate that something of the same battle is to be waged in psychology which was fought out and settled in England in the field of evolutionary biology fifty years ago.

II

The interpretative problem which faces this new discipline is that of isolating the sources of conviction and belief. Emphasizing the continuity of mental evolution, as opposed to the cataclysmic nature of social evolution, the investigators in this field must find relatively stable and uniform driving forces behind the various systems of beliefs. This is a very difficult problem, for personality and its forms of behavior are extremely complicated. Fortunately, the results of research in biology and psychology tend to introduce some simplicity into the matter. Even such widely differing doctrines as behaviorism and psychoanalysis have common ground. By "behaviorism" is meant the movement initiated by that radical group of psychologists who regard man solely as a biological creature, thereby excluding mind or consciousness as a causal agency in human conduct, and who disregard introspection (the main traditional method of securing psychological facts) as a valid method of studying human and animal psychol-

ogy. "Psychoanalysis" refers to that movement in psychology and psychiatry, closely associated in popular thought with the name of S. Freud, which seeks to reduce all higher forms of thought and conduct, scientific research, art, literature, etc., to "rationalizations" and "sublimations" of biological impulsions or instincts common to all higher forms of animal life. In accordance with these principles of rationalization and sublimation we remold, refine and modify our individually inherited cravings and emotions such as fear, rage, hunger and sex, so that they express themselves in forms which are socially acceptable.

While the behaviorists sometimes accuse the psychoanalysts of making mystical entities out of such concepts as the "psychic censor" and the "unconscious," and while the psychoanalysts can not sympathize with the behaviorists in their rejection of introspection as a technique, both are in accord in challenging the popular idea of the self-activity of the mind, or the notion of a self or ego as a non-biological causal agency or principle, which can create *de novo* its systems of beliefs, independently of the biological nature and social heritage of an individual.

If we sought to relate these psychological movements to the theory of relativity as a doctrine in physics we might state the matter as follows: Just as the physicist ignores the aether of space as a privileged "frame of reference," because it acts *as if* it did not exist, in the sense that its presence can not be detected by physical measurements, so in psychology mind is rejected as a privileged "coördinate system" for the reason that mind, as such, can not be isolated and measured by any known instruments yielding quantitative results.

III

As illustrative of what is meant by fossils of mental evolution we may cite the world-views embodied in primitive mythologies and cosmogonies, or theories of the origin of the universe and of man. All would agree that the conception of Thales, that water was the primordial stuff out of which things evolved, is but an interesting survival of a primitive view of the universe. In other fields the "social contract" theory of Hobbes and Rousseau, and the doctrine of the "divine right of kings," may be singled out as sociological myths which contemporary social philosophy has outgrown. A more controversial application of this science which reaches back into the childhood of the mind, in its attempts at exploring the obscure depths and shoals of the intellect, may be exhibited in an analysis of the recrudescence of spiritualism after the recent war. From a psychoanalytic point of view the belief in the continued existence of and possible communication with the spirit of a departed individual is an example of what is termed "compensation thinking." In its widest meaning this principle refers to the fact that we are always striving to realize ends which, if they are denied us in reality, lead us to the creation of an ideal world wherein these desired objects are regarded as already existing facts. Unfulfilled wishes are satisfied by the creation of an imaginative world wherein the things we desire are obtained. In this way the ideal world furnishes us an escape from the unwelcome facts of the real world. The virtue of this psychic motivation is that it is sometimes the only thing which makes life bearable, but the danger is that if it is carried too far, that is, if we live too much in the unreal world of sheer romance, it is likely to unfit us for living effectively in and solving

the problems of the actual universe. To return to our illustration, the psychoanalyst is likely to argue that spiritualism, as a belief in the continued existence of and possible communication with personalities "on the other side," appeals to many uncritical minds simply because it satisfies the ineluctable demand in some for the survival of their loved ones. The craving which the present generation has for "superman" literature is another instance of this same mental mechanism in operation, especially if there is reason to suspect an "inferiority complex" underlying the thirst for this type of literature. In this connection the fact that this semi-philosophical *genre* had such a vogue in the prewar Germany may or may not be significant. The extreme application of this view is to be found in the expositions of those psychologists who contend that the desire for personal immortality of any sort is a sublimation of the universal biological craving of the sexual appetite. Without, for the present, attempting to evaluate the validity of these latter applications of the doctrine, I cite them as illustrations of how the wish may become father to the thought and belief.

This way of viewing human thought appeals to those who are searching for theories the sweep of which is sufficient to include the entire span of mental evolution and the history of ideas. The "culture epoch" theory, which in social theory is analogous to the biological theory of recapitulation, holds that the mental development in the individual recapitulates the mental evolution of the species. Previous to this hypothesis attempts at such formulae for the movement of thought have been ventured a number of times. Hegel's statement of this developmental sequence as exemplifying the moments of the dialectic, the thesis, the antithesis, and the synthesis, finds a parallel generalization in Comte's conception of the three stages of the evolu-

tion of thought as given in the theological, the metaphysical and the scientific (positivistic) levels of explanation.

The part which temperament plays in the determination of one's outlook on life has always been recognized. The most obvious divisions of human beings on the basis of temperament are to be found in such contrasts as are designated by "optimistic" and "pessimistic," or "conservative" and "radical." A more opportune illustration is now embodied in the theological classification into Fundamentalists and Modernists. In more technical spheres we have the famous division by William James of the tender-minded and the tough-minded, which is paralleled in contemporary literature by the distinction which Jung has made famous by the terms "introvert" and "extrovert."

But the whole matter is far more intricate than any such dual division can indicate. In fact, such oppositions are rather arbitrary, and not easily maintained. For example, idealists have always pointed out that many to whom James applied the term tender-minded have been very active in social work and "practical" affairs. Again, one may be a radical on one subject and a conservative on others. Indeed, it is difficult to define these terms, for they are, like sanity itself, relative, varying between groups and in different periods of time. One may even be radical in his conservatism, as instanced by prominent opponents of views who, because of prejudices based on emotional bias, hold tenaciously to doctrines which are rejected by the experts competent to sit in judgment on the matter. This may sound like one of Mr. G. K. Chesterton's paradoxes, but it represents the truth of the matter—whatever that may ultimately mean. In the end, therefore, all that we have a right to conclude is that the explanation of the problem of why we entertain the opinions and beliefs we do hold to lies wrapped up in that most obscure word, personality.

IV

The problem of the analysis of mind as a system of beliefs, which constitute the intellectual framework of personality, is superlatively complicated, involving, as it does eventually, the old philosophical insolubilia, the "mind-body problem," and the age-old dispute of "mechanism versus teleology." Nevertheless, there are a few facts established, irrespective of how they are to be interpreted. If we look upon man's organism as a product of biological evolution, we may note that he, in common with his progenitors, is always faced by the necessity of presenting a unified and integrated system of responses to the external world. Beliefs are therefore necessary to action, for they represent past experience epitomized for present and future conduct. Admitting that so-called "motives" are frequently rationalizations of, or finding "alibies" for, what we do on instinct or emotion, it must be conceded that "ideas," whatever they are, are usually "dynamogenic," in that they have motor consequences, or lead to overt behavior. It is for this reason that most people can not endure what someone has called the agony of a suspended judgment.

Primitive credulity represents the tendency to believe everything, and to take all experience at its face value. This attitude is characterized by the term "naive realism." It is only by building up a system of collateral ideas, which serve as checks upon the tendency to react immediately to the given stimulus, that men, as individuals, have accumulated serviceable reservoirs of knowledge which they can bring to bear upon the novel situations which present them their problems. That is to say, anything is believed and acted upon for which there is no counteracting idea, and hypnotic suggestion consists in limiting the field and ban-

ishing from consciousness these collateral ideas which normally tend to inhibit or prevent responses. Since our ideas are so intimately bound up with conduct anything which upsets our cherished notions is uncomfortable and unwelcome, if for no other reason than that it disorganizes and throws into chaos the neurone patterns in the brain. It is not surprising, therefore, that individuals vigorously resist encroachments upon their religious or political faith, for disintegration of one's faith is here striking at the very roots of one's being.

There is, then, this conservative tendency, which leads us to view with hostility any unfamiliar idea, or one which does not fit in with our accepted notions. In society this conventionalized system of beliefs constitutes the "mores" of the group. On this plane of thought discussion of an issue frequently takes refuge in stereotyped phrases which arouse emotional response in the individuals of the group because they have what might be called a "herd complex" on this subject. Campaign slogans of political parties are apt to be of this character.

On the other hand, there is a desire for new experiences, and it is this reaching out for novel environmental contacts which leads the thinker into new fields of investigation of discovery. The interaction between these sometimes conflicting modes of action, the tendency towards standardization and the movement towards variability, is further complicated by the fact that all organisms, except parasites, are centers of complexes of energies, which are quantitatively greater in amount than is necessary for the immediate demands of the environment, i. e., maintaining an existence. We sometimes expend this super-abundance of energy by trying to impose our own accepted systems of beliefs upon others. Such individuals are known as reformers, and they are apt to make themselves obnoxious to others who believe in the *laissez-faire* doctrine so far as

this particular subject is concerned. What this energy is which, in us, constitutes the moving power behind what optimists choose to call progress is an inscrutible and hence a fascinating mystery. Jung's conception is that of a primal energy of life, which is the living power of man's creative desires and interests. Bergson's conception of the vital impetus (*élan vital*) is somewhat similar. From a scientific (mechanistic) point of view, life, or living protoplasm, like yeast, is a fermentation of chemical elements, and the only difference between man and more primitive or less differentiated aggregates of colloids is that we have fermented to the extent of effervescence, and this bubbling over we call art, science and culture.

In any event, we are beings who must believe something —one can not even be a consistent sceptic, for the sceptic must at least believe that he does not believe. Our beliefs may range from the lower limit where we have what, adopting a phrase from Santayana, we may call an animal faith in the existence of an external world, to the highly elaborate *weltanschauung* which Bertrand Russell attributes to the system making vanity of the philosophers. Between these two limits we find all sorts and degrees of belief. On the whole it is found that the process of creating beliefs is so engaging that it is indulged in to the limit, and the limit is the amount of mental energy which the individual cares to expend. Really consistent thinking, however, is hard work, for the checks and obstacles which facts put in the way of intellectual progress is baffling and discouraging. It takes only one nasty little fact to kill a beautiful theory, as Huxley somewhere says, and this is the tragedy of all scientific and philosophic thought.

And why are we thus relentlessly driven on towards goals, all-inclusive explanations, which we can never hope to reach? Without doubt, one of the greatest incentives to effort in research is the desire for social recognition. This

may drive a thinker deliberately to formulate a theory which appears radical because it singles its proponent out from his colleagues, or the mass of people who constitute the conservatives on that subject. On the other hand, there is a genuine quality of intellectual honesty which sometimes leads to revolutionary ideas which are real advances. Einstein's theory of relativity must be reckoned as such an advance. The love of knowledge for its own sake, the disinterested interest in the "particular go" of things, without reference to the monetary and practical value of results is perhaps the greatest gift to the human mind. It is the Promethian fire of the intellect which lifts man to the stars. It is conceivable that one of the worst forms of torture is to feel the surge of creative energies, seeking some form of expression, without finding an environment wherein the products of genius are recognized.

The explanation of the one-sided development of talent, which is frequently to be found in genius, lies, perhaps, in the inheritance of mental traits, a doctrine which genetics is in process of establishing. This may also throw light upon the rather rare type of individual who is radical on one subject and conservative on others. On the whole, people who are born heretics and dissenters are non-conformists on most subjects, but there are individuals who rebel only against a particular system of dogmas. It is difficult here to separate the hereditary from the environmental factors, and there is still question as to the mechanism of the inheritance of mental traits, but if the same Mendelian principles hold which obtain on the levels of strictly biological inheritance (color of the eyes, etc.) then these special abilities (musical, mathematical ability, etc.) behave as "unit characters," more or less independently of each other. It is not strange, therefore, that versatile individuals with a wide range of interests and exceptional abilities in diverse lines should be so rare.

This may also account for the tendency which people in general have of keeping their various systems of beliefs in water-tight compartments; so that, for instance, one's scientific beliefs do not flow over into and influence one's religious convictions. Personality, as a unified and well-rounded out individuality, constituted of a variety of interests and a rich sense of values subordinated to dominant rational purposes, is not a gift, but an achievement. In short, many persons are not individualities; they are societies of selves, with conflicting impulses tending to disintegrate their individuality into a lunatic asylum of disharmonious clusters of alter-egos.

In order to hold firm convictions one must be impervious, to some extent, to other points of view. Those who have written theses "in defense of prejudice" recognize that prejudices are necessary and justifiable, up to a certain limit which is hard to define. Liberalism, or the toleration of any and every doctrine and creed, is sometimes only a symptom of shallowness. The dogmatist is one who drains all his mental energies into one channel of thought. His beliefs get so ossified that he can not understand how any one can disagree with him. A mind may become more resistent than steel to the impact of novel ideas. All reformers are persons who have become obsessed with ideas —they are mono-ideaists. I do not use the word in a derogatory sense. Reformers are necessary—did not even Socrates compare himself to a gadfly? If their ideas run in the direction of a clamor for the "good old days," they are examples of arrested mental development. If their ideas are so new that they are rejected in their own age, but accepted in subsequent ages, they are prophets and geniuses. The dogmatist is apt to become a fanatic, i. e., one who is dominated by fixed ideas. The liberal, because of his wider range of experience and his more permeable nervous system, is not so walled up in his universe of be-

liefs, and is therefore more susceptible to new ideas. If we must choose between fanatical dogmatists and unprincipled liberals, the liberals must be preferred, for more harm is done by well-meaning but misguided reformers than by unscrupulous intellectuals.

To understand any individual's system of beliefs one must understand his social environment—the socially inherited system of beliefs, customs and practices of the culture epoch. Considering in addition to the social forces the individual components of belief and conduct, it is obvious that the problem of the interrelations of the two become almost too complex to handle. The difficulties are increased when it comes to analyzing these components which are known as beliefs, ideas, concepts, feelings, etc. The question of whether personality is nothing more than the biologically inherited modes of response (reflexes, instincts, etc.) as modified by experience (environmental influences) is one which always invites disputation; again illustrating differences of temperament and training.

Recent research on the influence of the secretions of the ductless glands (i. e., the endocrine glands, which discharge their *harmones* or "chemical messengers" directly into the blood stream) suggests that the whole organic apparatus controlled by the autonomic nervous system (i. e., the whole mechanism of the "sympathetic" nervous system, the glands, and the "smooth muscles," all of which are concerned in the expression of the emotions) must be taken into account in any theory of personality. However, the fact that we do not ordinarily attribute much personality to guinea-pigs, which are, so far as glands are concerned, about as well-equipped as human beings, indicates the extremes to which the glandular theory of personality may be carried—especially by the popularizers of psychology and the hangers-on of psychoanalysis. While it is certainly an exaggeration to say that famous military leaders

failed to conquer the world because, perchance, of a hyperactivity of the pineal gland, or a failure to function normally of the pituitary body, or what-not, the fact that it is possible in some types of cases of arrested development to appreciably raise the "intelligence quotient" of an individual by feeding him thyroid preparation, or some other glandular extract, is a matter of such importance that it puts the hormones (a better term is "autocoids") in the class with enzymes and vitamins as chemical regulators of bodily metabolism and mental behavior.

V

With the rise of the sciences of ethnology, anthropology and sociology the study of the primitive mind has taken on added significance, for with the progressive discovery of the missing links between primitive cultures and more modern civilizations it is being more clearly established that the human mind as we know it today has somehow evolved from the sub-human mind. The literature on this subject is large, and still growing. One of the few beneficial results of the war is the renewed interest in history and human culture.

Historical method has been applied to the comparative study of religion, and results in this field throw light upon the psychological motivations of religions, not only of primitive cultures, but also of religions of today. Taking primitive religion as a subject, it is our purpose in the following section to analyze the historical and psychological origins of this fossil of mental evolution from the viewpoint of paleo-psychology.

Primitive man's speculations concerning the world are embodied in the system of thought known as *animism.* It is the belief in a living or vital force, which is the source

and sustainer of all the varied phenomena of nature. This notion that everything is alive and pervaded by a spirit is sometimes known as pan-biotism. Man spills his superabundant vital energies over into the events and processes surrounding him, and personifies what we now take to be the material forces of nature.

The universal life or breath pervading all things is individuated, so that specific activities come to be the expression of particular personal powers. This is the origin of the gods of mythology. Storms and catastrophes are the expression of the anger of the gods. An arrow does not fly straight because it is possessed by an evil spirit. These beings, however, can be controlled to some extent by magic, sacrifices, prayer, and even threats.

But religion for primitive man is something more than a system of beliefs about the causes of natural phenomena. It is known that religious practices are also to be regarded as a means for controlling the behavior of the group with reference to the needs and ends which are most insistently felt by the group. Primitive group solidarity appears in the conception of sin, which, at this stage, is not so much a falling short of ideals as it is a ritualistic breach or violation of external forms. The gods, like conscience in man, is the "echo of the tribal self," and crystallizes the mores or customs of the group. But whatever the humble origin of the religious attitude, it is evident that men are not usually content to worship gods of moral character inferior to themselves. This stage is illustrated in the philosophy of the Greeks, who criticized the ethical ideals of the gods of Olympus, as popularly conceived, and as pictured by the poets of the time. Religions may therefore be placed higher or lower in the scale, accordingly as they have been submitted to rationalizing, sublimating and purifying influences. Thus, it is generally agreed that monotheism repre-

sents a higher stage of religious thought than pagan polytheism, or the henotheism of the ancient Hebrews.

The attempt to control by magic the forces of nature is the origin of what later developed into science. Animism is the only kind of analysis at the disposal of primitive man. But as the analysis of the phenomena of nature continued, the supernatural element gradually dropped out. Causal relationships were depersonalized. In time, astronomy replaced astrology and chemistry superceded alchemy. It is only recently that biology has banished the vital forces which it inherited from the animistic view of nature. The result is that the external world is now conceived as a vast mechanism, devoid of all the richness and beauty we think we perceive in nature, and man stands alone in the stupendous universe of space, time, and matter as a conscious, reasoning, loving, fearing, and aspiring being. The paradox of modern science is the attempt on the part of the mechanistic behaviorists in psychology to apply this capacity for reason to the problem of the reduction of man to the level of the material universe of meaningless and unreasoning tractations and pellations of electrons and protons in space.

Those who do not believe that this reduction is feasible or legitimate are apt to interpose the question: Why should natural processes be personified by the primitive animistic philosopher? How can external forces be considered as the objectification of intelligent living forces if man himself be but a complicated sum of physiological processes? In the words of T. H. Green, is not any philosophy inadequate which ignores the philosopher himself? It is the common belief among men of science that the notion of *force* originated in the sense of effort which all experience in doing work, or accomplishing results by overcoming resistences. If animism or vital dynamism arises out of the externalization of the sense of human activity, the sense

of effort projected out into the objective world, does not this testify to the existence within the human being of an active mental agent of which muscular activity is but the bodily expression?

The scientist, insofar as he theorizes about the ultimate explanation of the phenomena with which he is concerned, is likely to adopt the position which may be termed physical monism. Without trying rigorously to define this term, which must vary in its connotation with the varying conceptions concerning the nature of the ultimate elements of the physical universe, we may note that it implies that all processes involving transformations of energy follow the principle of the conservation of energy. As the historical continuation of what is known as materialism, this doctrine asserts that every form of behavior, whether in the organic or the inorganic realms, is the expression of a law which states that all activity proceeds in the line of least resistence, or obeys the principle of *least action,* and that the supposed exceptions to this rule are only apparently so. Consequently, the subjective feeling of effort is not a violation of this principle. The sense of activity, of surmounting obstacles by an effort of the will, is the sum-total of the *kinaesthetic* sensations, or sensations of muscle strain, which accompany all bodily activity.

There are definite sense organs, known as "interoceptors" and "proprioceptors," which receive and transmit these impulses of tension, effort and strain. For a materialistic psychologist the idea of self-activity, or "freedom of the will," is a delusion. However, the mechanist in psychology, or one who believes in the universal application of the doctrine of physical monism, must give an explanation of the origin of animism, and he must account for the present misconceptions of popular psychology, that we possess a mind, if he is to complete his theory and make it plausible. Without committing ourselves to it, the follow-

ing is presented as a monistic explanation of the origin of the belief in a non-biological or supernatural principle in human beings, the soul, self, or mind, which monistic account would be acceptable to the psychologist who would reject these concepts as symbolic of realities, but who would admit them as historically real products of the evolution of thought.

VI

The problem we have before us is this: assuming, tentatively, that the particular biological variation we know as man is nothing but a physiological machine for converting stimuli into reactions, how can we explain the origin, in this organism, of the idea that he possesses what he calls a mind, with attributes entirely different from those which are known to be attached to the physiological mechanisms of behavior? How, in a word, can physiological processes give rise to the conception of, and swear by the reality of, non-physiological processes?

First of all, it must be noted that many of the theories and practices of primitive man, with his anthropomorphic conceptions of causal relationships, seemed plausible and efficacious to him because they are based upon a defective logic. This period with which we are dealing has been called the pre-logical stage by Levy-Bruhl. Most of the superstitions and religious and magical practices of primitive man are the result of errors of logic which are technically known as the fallacy of false cause, the neglect of negative instances, and argument by analogy.

The processes of reasoning by analogy has been the most disastrous of all the illogical procedures whereby the mind falls into error. An outstanding example of its fallacious application is to be found in the very natural personification

of the forces of nature, once the idea of the soul had been conceived to explain the actions of man himself. By analogy with the cause of human behavior, primitive man argued that anything which behaved anything *like* a human being was animated by a Ka, or pneuma, or spirit, or mana, which was alive. If a stone fell from a cliff and killed a man it was because it was possessed by a spirit. Xerxes, preparing to cross the Hellespont, finds the sea rough. What is his natural response? He orders the slave to give the sea a hundred lashes. The argument here rests upon the following inference: motion or activity is a sign of life; therefore, everything which moves is alive. It was only by ignoring exceptions to accidental coincidences, or explaining away the negative instances which called into question these superstitious beliefs, that primitive man could preserve his faith in the good old religion of his forefathers. And it was only in the school of experience that man subsequently built up the methodological processes or system of scientific inference which enables him to avoid committing what now seem to us such elementary logical blunders.

However, thus far, we have assumed that the animistic view of the universe presupposes the reality of a spirit within man without the externalization of which it would be impossible for man to ensoul the choir of the heavens and furniture of the earth. We have not yet accounted for the origin of the notion of the soul in man, which is to be projected out into the forms and events of the objective universe.

To be able to account for the origin of animism on monistic principles it is necessary to assume that primitive man had to have a theory of behavior, and that an organism with a theory of behavior has the advantage over an organism without a theory of behavior. A theory, in this case, is simply a tentative plan of action. The possessor can

thereby anticipate what his fellow creatures are going to do, and act accordingly. To be able to predict what your friend or enemy is going to do involves observation and interpretation of what other creatures have already done under similar circumstances. The possibility of this analysis, wherever it may have first occurred in the misty morning of the intellect ages ago, and whatever its biological conditions may have been, whether in the ape-man of the preglacial period, the Java, Foxhall, Heidelberg, Piltdown, or the Neanderthal man, all of whom lived from 500,000 to 100,000 years ago, or whether this capacity for analysis and synthesis took its origin still more recently, in the postglacial period, in the Crômagnon man, who roamed the plains and inhabited the caves of Western Europe only 25,000 years ago—whatever the time and place of the origin of the tendency to explain and predict, it must be recognized that at this stage in evolution a new principle of selection was substituted in the struggle for existence. A new instrument, reason, involving memory and creative imagination, from thenceforth gradually replaced the older factors of survival; and sharp teeth, powerful muscles, and mere size and sheer weight yielded to the most mighty and subtle of nature's creations, the neëncephalon or cerebral hemispheres of the big-brained mammals.

Very well, then, here we have primitive man, with a tendency to cogitate and to explain things. Why did the explanation take the form known as animism? What are the phenomena which suggest this explanation of nature and of human nature?

All students of the subject agree that one of the most important factors in the construction of the animistic explanation is the phenomenon of dreams. In dream life primitive man's friends or enemies appeared before him; but the bodies of his fellow men were known to be miles away. Similarly, he himself could visit his friends or ene-

mies while his body remained stationary. Human beings, he was forced to argue, must therefore possess a duplicate of the visible body, which must be of a finer stuff because it is more nimble and elusive than material bodies. And this subtle replica is not subject to the ordinary limitations of time or space.

Having no idea of the actual physiological bases of dreams, primitive man interpreted what we now know to be conditions of our own ordinarily invisible nervous systems, but about which he had no information, in terms of visual and memory images. Shadows, images of himself in pools of water, etc., helped to confirm the idea of a breathlike double of the body, though this duplicate was still conceived as semi-material. This soul-body can move around and go on journeys while the waking body is inactive. In death this more nimble manikin fails to return from its wanderings.

Another characteristic of primitive thought is the tendency to regard all processes or functions as entities. Sickness, stomachache or headaches are now held to be disturbances of the normal functioning of bodily processes. Primitive man made entities out of these disarrangements of function—he "hypostatized" forms of behavior. Disease and insanity were regarded as obsessions, and the way to get rid of them was through magic incantations and exorcism. Thus, a headache is due to the presence in the head of a spirit, causing a disturbance because it can not get out —unless, as was done in some primitive groups, the skull was trephined to provide an opening. A similar belief is found in the Greek myth that Minerva sprang full-armed from the aching brain of Jupiter. Primitive therapeutic practices still survive among present-day "mental healers," and for that matter, psychoanalytic treatment is not so far removed from the ancient practice of "casting out devils." In this way, processes, functional relationships, and forms

of behavior are treated as things or entities; the mind is conceived as a thing, by analogy with other things. On the whole, we may affirm that primitive man materializes what later people regard as spiritual, and spiritualizes what physical science has taught us are the material forces of nature.

Once having arrived at the conception of the soul, the endowing of all the phenomena of nature with a spirit was natural. The idea of an ethereal, but still attenuated material, duplicate of the body was ejected into the behaviors of the objective world (trees, winds, clouds, streams, etc.) because there was no other explanation available. Why animism was an inevitable stage in the evolution of human thought is not difficult to show. Other human beings are the natural environment of man, primitive or modern. People are gregarious, and live in groups. Man is a social animal, as Aristotle puts it. Reactions to other human beings are therefore the habitual modes of response. The personification of the forces of nature is due to the tendency to react to unfamiliar objects or events with the old familiar set of responses, the habitual adjustments, man employs in response to other individuals. Animism is this tendency to respond to things as persons.

That there still lurks within us this same cave-man is demonstrated by our similar tendency to respond to things as persons. Anything which offers resistence to our determinations is regarded as endowed with a personal spirit of opposition and rebellion, and we heap invectives upon the evil spirit which animates its unruly behavior. Moreover, we still find in nature the reflection of our own subjective states. A sunset is beautiful; a rainy day is sombre—and so on; but, of course, beauty and melancholy and joy are not in the objects, but in us. Aesthetic appreciation is based upon this tendency to read our own subjective personal states and affective dispositions into disinterested nature.

Poets speak of the "slumbering sword," or how the "mountain lifted up its shoulder," and these expressions inspire a thrill in us because they bring these objects nearer to us, to our own feelings and experiences. *Empathy* is the technical name given to this tendency to humanize things.

Religion, likewise, protests against the arid intellectualism of science, and the devastating analysis which reduces nature to a vast, senseless whirl of atoms and electrons, combining, separating and recombining in meaningless configurations of mass particles in space. Is there no permanent meaning continuous with the cosmic order, lending spiritual significance to the universal processes? Is there no Ariadne's thread running through the tapestry of evolution, no pattern of design, certifying that man's valuations of worth, sacrifices for the future, and affirmation of a higher reality interpenetrating what seem to be the soul-less mechanisms of the universe, are of permanent significance? Is not man himself more than an alien and inexplicable excrecence in a meaningless universe supremely indifferent to human aspirations—a universe which is destined in a brief span of time to swallow up in some cosmic calamity, or return to the primitive star-dust, this rebel who but disturbs for a moment the universal silence of the great Unconscious?

VII

Since the epoch of primitive thought the idea of the soul has undergone an evolution. Many layers of ideas have added their strata to the earlier fossils of mental growth. Insofar as the idea of the soul has not been given up entirely, the principle contrast between the modern notion and the primitive conception lies in this: whereas in primitive animism the soul is conceived as quasi-material, the

modern doctrine on the contrary, holds the soul to be non-spatial and non-material. This distinction was introduced by Descartes, though the problem of the relation between the soul and the body appears in Greek philosophy. Apparently, the early Hebrews entertained no conception of an immortal soul, and, without doubt, many Greek ideas have crept into the doctrine of soul imputed by theologians to New Testament scriptures.

Why, we may ask, should the idea of the soul have undergone evolution? One might well argue that the desire for immortality, whatever its psychic motivations, is one of the factors responsible for the sublimation of the idea of the soul. That is, in order to guarantee the possibility of its continued existence after the death of the mortal body, the soul had to be dematerialized, for if it were material it would be subject to the same laws of disintegration and decay to which all physical bodies are subject.

One of the most interesting and important aspects of the evolution of thought within historical times is the development of the animistic conception into the doctrine which has been variously designated as two-worldism, dualistic supernaturalism, or the preëvolutionary view of man and morality. The social and moral consequences of this view have been most profound. The dualism of the eternal and perfect universe set over against the imperfect world of change, of a higher world of the spirit opposed to a lower world controlled by a principle of evil, was first enunciated in Western thought by Plato. Forming the background of Christian theology, the views of Plato and Aristotle have entered into the very texture of Occidental thought, blending into the Scholastic system a corresponding ethical, psychological and political pattern of ideas.

That this is not a matter of purely theoretical or historical interest, and that one's theory of mind and of human

conduct does have practical educational and social implications is familiar to all who are versed in the history of pedagogy. The classical cultural theory of education was based upon the psychological doctrine of "faculty psychology," with its concomitant conceptions of "transfer of training," and the doctrine of "formal discipline." Similarly, and more relevantly to our own immediate problem, the supernaturalistic dualism of a higher and a lower nature in man, had immediate social consequences. The theory that the animal appetites constitute the lower nature of man, which must be repressed and strangled as part of the world, the flesh and the devil, has, for better or for worse, established taboos from which we may never be freed.

That this ethical dualism is the logical consequent of the psychological dualism established by animism is, I believe, reasonably self-evident. From a slightly different angle, another social consequence of the ethical correlates of the intuitionistic theory of conscience, or the doctrine of innate moral ideas, is to substitute a blind obedience to abstract rules of conduct, grounded in a world of eternally fixed standards, for an intelligent morality which finds the sanctions for conduct in the concrete consequences of one's acts upon other human beings. However, the most irreparable damage wrought by the preëvolutionary conceptions of two-worldism is the notion that matter is a principle of evil.

The doctrine that matter is evil, which appears in medieval monasticism, and which reappears in the degenerate Berkleyan idealism of Christian Science, is but the noisome aroma still lingering over the decaying corpse of ancient puritanism. From the point of view of paleo-psychology this doctrine is one of the fossils of the mind, a petrified form deposited in the evolution of the human intellect, which should have remained buried in the earlier strata of

mental development, but which has been uncovered and bowed to by those atavistic worshippers who are unable to distinguish archeological stones from the true bread of life.

VIII

In the preceding pages I have tried to show how inevitable animism and two worldism were in the development of human thought; and that these doctrines must have possessed intellectual survival value in the age of their inception, whatever their worth may now be; that the evolution of human thought could not have been other than it was; and that our problems today, moral, intellectual and social, are what they are because of their historical settings. This manner of regarding our ideas as systems of adaptations to the physical, social and intellectual environments suggests a number of observations, which bear upon the present conflict of ideas.

Since the "group mind" usually tends to cling to the cultural heritage of the past, we must look to the individual, who alone formulates creative conceptions, to initiate the new idea-complexes which make moral and intellectual progress possible. But our educational systems and social mechanisms must not only be adapted to facilitate the progress of the gifted student, and to provide opportunities for the expression of the capacities of exceptionally endowed individualities—though, of course, here in America there is much need for the greater recognition of the superior ability of the trained expert—but our emphasis should also fall more upon the need for that flexibility of mind, and adaptability to novel ideas, which is necessary in the adjustment to the new and complex problems which have developed out of the growth of nationalism, the advent of the industrial revolution, with all its economic and social

problems, and the growth of the sciences, the results of which seem to throw in doubt many of the traditional notions supporting the religious idealism of the age.

This does not imply that we must disregard the spiritual and cultural heritage of the human race, or that we are to look with pity or contempt upon any system of thought which appears archaic and outworn to our own enlightened age of self-conceit. What we need is a more disinterested interest in the achievements of the mind, a more artistic attitude towards the products of the culture of other ages and races. Such an appreciative attitude does not sap our enthusiasm for the art, literature or intellectual and religious accomplishments of other cultures, but rather enhances our interest in them.

From this point of view, the history of civilization is the march of the mind through time. It is the story of minds with the passion to create; of minds feeling the need to give expression to the yearning to mold the world a little closer to the heart's desire; of minds ever in quest of some golden fleece or holy grail; of minds on fire with ideas which would make a funeral pyre of the unjust social order, and replace it with Utopia; of minds which, Icarus-wise, attempt to fly to that City of the Sun, which, it seems, is always to remain the Promised Land; of minds which, tentatively exploring the shoals of the universe, are eventually drawn outward to depths which do not answer to the soundings of our plumbs.

Such an aesthetic interest and delight in the panorama of human thought averts the catastrophe which results from tying up our moral idealism with a system of belief involving the literal acceptance of any system of creeds as absolute truth, once for all revealed. By moral idealism is meant the faith in the possibility of the creation, through intelligent and enterprising good-will, of a better order of things here on earth, and the hope that we are all coöp-

erating in the realization of some pervasive, intelligible scheme of things, however inscrutable it may appear in stellar evolution, and dimly it may be foreshadowed in the ascent from amoeba to man. Thus viewed, the binding of the ethical teachings of Jesus to theological conceptions of a geocentric universe and an anthropomorphic interpretation of nature has been a detour in moral progress. From a broader point of view, however, this movement of thought arises as an inevitable conflict of the various forces within man himself, a conflict the resolution of which will, in time, transform both scientific and religious conceptions.

We are living in a creative and evolving universe, and no system of dogmas can be regarded as final. For this reason, no attempt has been made to lay the foundations for that structure of beliefs which we must all labor to create, if we are to live effectively in a universe teeming with problems which challenge our adventurous minds.

That there still exist intellectual problems, as such, in addition to the problems of applied science and social maladjustment is clear. After all is said, it is evident that no analysis of the historical and psychological origins of ideas, whether the idea of the aether of space of the physicist, or the concept of mind of the psychologist, or the notion of God, freedom, and immortality of the religionist, will tell us much about the truth or falsity of the belief in the supposed realities which these ideas are held to symbolize. We have heard much within the last few years concerning the salvaging of civilization—but the previous question still remains to be asked: If man is what some materialistic physicists and a greater number of mechanistic psychologists assert that he is, are man and society worth "salvaging"?

The test of the logical consistency and workability of any ethical system is its theory of social obligation. Every moral theory must provide an answer to this question:

Why should one be good, if by disregarding the rights and interests of others one can thereby increase his own private gain? On the one hand, idealistic moralists proclaim that no generation of thinkers has been satisfied with a materialistic philosophy, and that it is absurd to suppose that one can get a theory of personal responsibility and social obligation out of mechanistic psychology. On the other hand, the behaviorist may argue that it is only because ethical theory has traditionally been tied up with some form of supernaturalism that it *seems* impossible to base a categorical morality on physical monism. From this point of view the vituperations which those who hold that the universe is controlled by "spiritual values" hurl against "crass" materialism only beg the question in appealing to an inherited prejudice—the old superstition that matter is inherently evil. Indeed, Jacques Loeb, prince of mechanists, was not content to remain on the defensive, and, no doubt, his followers will push forward with increasing audacity along the lines of advance which he opened up.

I do not propose to attempt to resolve this great paradox which must inevitably arise in the course of the evolution of the human organism.

OLIVER L. REISER.

OHIO STATE UNIVERSITY.

DYNAMIC POLITICS AND THE NEW HISTORY

I. The Nature of Political Science

POLITICAL science in a broad sense may be looked upon as the study of the agencies, methods and results of the public or official and legalized control over individuals and groups of individuals in organized society. There are, quite obviously, many other potent forms and instruments of social control, in addition to the state, which coerce, guide and direct human activities, such as public opinion, custom, tradition, habit, and the rules of business and of many other types of human groups. Some of these are more elemental and basic than the state, have existed from an antiquity far greater than that which can be claimed by the state, and have no little part in securing for the state that obedience from its citizens without which it could not exist or function for a day. Further, most of the causes for and justification of the existence of the state are not political in nature or origin. The state exists primarily to allow the orderly functioning of economic and social life, and properly to regulate the processes, conflicts and struggles of diverse and contending social and economic groups. Hence, it is readily apparent that no student can obtain the proper perspective with which to approach intelligently the problems of political processes and institutions without that substantial grounding in sociology, anthropology and psychology which will make it possible for him to view the state in the setting of its relation to the other

forms of human groupings and organs, of its gradual genesis out of earlier and less formal types of public and semi-public control of conduct, and of its dependence upon the mechanisms of custom, habit and obedience upon which orderly political relations are founded. Political activity, then, is demonstrated to exist primarily for the purpose of regulating, controlling and at times encouraging and improving, the non-political institutions and processes in human life which make individual existence or group life possible.

The state is not, then, for or of itself, or an end in itself. It is nothing mysterious, unique or ineffable, but rather something which is still a rather clumsy and expensive but indispensable instrument for maintaining and advancing the conditions of human existence and social progress. It is as susceptible to intelligent study and analysis as any other form of human association, and its improvement is a subject for legitimate suggestion by competent students and publicists. And the processes and problems of political life will be understood aright only when they are thus studied in a realistic and secular fashion, though it should be borne in mind that a rejection of the mystical and reverent conception of the state does not carry with it the impossibility of entertaining a wholesome respect for political institutions and their place in human society. Indeed, it is difficult to understand how a competent student of the social sciences could fail to respect the function of the state, however much he might feel called upon in candor to condemn the faults and defects of particular states at a specific time or place. Perhaps as good a summary of the scope and problems of political science as has been provided in so brief a space is that submitted by Professors Gettell and Shepard:[1]

[1] *Report of the Joint Commission on the Presentation of Social Studies in the Schools*, p. 6.

"Political science is a study of the state, a term which includes all forms of political organization. It deals with the life of men as organized under government and law. As its distinctive contribution to the social studies, it gives an understanding of social control by means of law and of the promotion of general welfare by means of governmental action.

Political science includes a study of the organization and activities of states, and of the principles and ideals which underlie political organization and activities. It deals with the relations among men which are controlled by the state, with the relations of men to the state itself, and with those aspects of international life that come under political control. It considers the problem of adjusting political authority to individual liberty, and of determining the distribution of governing power among the agencies through which the state's will is formed, expressed and executed.

Political science seeks to develop in individuals a sense of their rights and responsibilities as members of the state, and a realization of the significance of law. It substitutes accurate information and intelligent opinion for emotions and prejudices as a basis for forming judgments in politics and world affairs."

II. Some Leading Stages in the Development of Political Science

Political science as a well-defined branch of human inquiry delimited to a study of the state and its agencies dates from about the last half of the eighteenth century. Previous to that time it had been embedded in the broader and less precise field of speculation known as political philosophy, which included pretty much all that is now embraced

in all of the social sciences—sociology, anthropology, economics, political science, jurisprudence and ethics. Not only was political philosophy broader in scope than political science; it was also distinguished primarily by an *a priori* method and deductive analysis rather than by the empiricism, induction and observation which characterizes contemporary political science. Certain exceptions could, of course, be cited, such as Aristotle, Bodin and Montesquieu. Finally, the terminology of political philosophy was much less complete, precise and exact than that which has been worked out in political theory and practice in the last century and a half. These interesting distinctions can best be understood by comparing with a twentieth century college manual on political science such a work as Samuel Pufendorf's *The Law of Nature and of Nations*, probably the most thorough and comprehensive product of the centuries of political philosophy.[2]

The transition from political philosophy to political science was not abruptly effected nor did political philosophy cease to flourish, as may be discerned from the appearance in the middle of the nineteenth century of such works as those by Lieber, Mulford, Hurd, Brownson and Thomas Hill Green, not to mention the more recent work of Bernard Bosanquet. There were, however, a number of specific contributions made to the methods of approach to political problems and institutions which ultimately created the technique and attitudes which constitute political science as conceived of today.[3] Among these may be named the further development of the observational and comparative point of view by Voltaire, Montesquieu and Herder; the elaboration of the conception of development and dynamics in political life and institutions by Ferguson, Condorcet,

[2] The development of political philosophy can best be traced in the first two volumes of W. A. Dunning's *History of Political Theories*.

[3] The majority of these developments are well described in Dunning's *History of Political Theories from Rousseau to Spencer*.

Hegel and Comte; the analysis of the psychological basis of obedience and social groupings by Hume, Adam Smith and Comte; the emphasis on the importance of economic factors in the state by Locke, the American "Fathers," the Physiocrats, Adam Smith, and the Ricardian Socialists; the investigation and classification of geographic influences in politics by Montesquieu, Humboldt, Herder, Ritter and their successors; the indication of the social derivation and setting of the state by St. Simon, Hall and Comte; the introduction of the concept of quantitative measurement of political and social phenomena by Quetelet; and the provision of more adequate and precise political nomenclature and phraseology by such Utilitarian writers as Bentham and Austin.

As is usually the case in the development of a distinct and well demarcated science, the first step in the growth of political science was the concentration upon the definition of political terms, the classification of states, forms of government and types of political institutions, and the analysis of the general nature of human conduct made possible under the terms of specific written constitutions which indicated the legitimate degree of state-activity permitted, as well as the nature and types of political liberty and personal immunity enjoyed.[4] It was much the same sort of service that was performed for the biological sciences by Linnaeus a century earlier. While often, and perhaps legitimately, criticized as formal and sterile and offering little insight into political processes and affording no guidance for political practice, it is possible to overlook the very real importance of this stage of the development of the subject. Before institutional history and functional analysis could proceed far in the science of politics it was neces-

[4] The scheme of classifying the stages and types of political science which is here followed is a revision of that suggested by Professor Charles A. Beard in unpublished lectures. See also Chapter I by C. E. Merriam in Merriam and Barnes (Eds.), *A History of Political Theories: Recent Times.*

sary to have a uniform nomenclature and terminology and some clear understanding as to political forms and types. The most serious error which has arisen has been on the part of those who regard this preliminary stage of definition and classification as the completion of the scope, method and purpose of political science. Among the writers most influential in forwarding this type of work in the field would certainly be mentioned Jeremy Bentham and John Austin, J. C. Bluntschli, R. Von Mohl, J. G. Droysen, Francis Lieber, Theodore Woolsey, John W. Burgess and W. W. Willoughby.

A step in advance was taken when certain writers refused to be satisfied with a discussion of political forms, but insisted on investigating the diverse and interesting products of the various types of political organization in the form of concrete legislation. Such activity consisted primarily in making a comparative study of the nature, content and purposes of contemporary legislation, and has been called by some the "statute law stage" of the development of political science. As among those who have represented this stage of political analysis would probably be included F. J. Goodnow, E. Freund, W. F. Willoughby, S. M. Lindsay, J. A. Fairlie, F. Pollock, W. J. Brown, A. V. Dicey, and M. Esmein.

It was soon perceived, however, that beneath and back of legislation and law-making were the problems and processes of political action and party government which required study and explanation in order that the nature, methods and purposes of legislative activity might be adequately understood and expounded. The mode of choice of candidates for legislative offices, the methods of election, the nature and operation of the party machine, the genesis of platforms, party government in legislatures and committees and the effect of party government on the several departments are all problems which demand careful

investigation and analysis. An anticipation of this approach appeared in the work of DeTocqueville on American political life which was publish nearly a century ago. But the first conspicuously successful effort to describe the actual working of party government was achieved in Woodrow Wilson's *Congressional Government,* published in 1885. The method was pursued further in certain sections of James Bryce's *American Commonwealth,* and reached its culmination in the works of Ostrogorski. Mention should also be made here of the application of the same method to the analysis of European governments by President Lowell, and to Redlick's analysis of English local government.

Even an acute, candid and accurate exposition of the nature and operation of party machinery is, however, only a step towards understanding the nature of party government. There still remain a number of basic questions such as what makes the party go; from whence does it derive its support and tenacity; what are the types and modes of pressures exerted upon legislators and representatives of other branches of government; how does government balance or harmonize these contending interests; in short, what are the real and vital dynamics of government and party life? To answer such questions one must have recourse to sociology and economics, and investigate the origin and nature of social groups, the mode of their organization and conflicts, the nature of the economic interests in society and the manner of their impingement upon lawmakers, executives, and courts. While this line of analysis was suggested in an elementary way by Johannes Althusius as far back as the sixteenth century, and was clearly expounded and advocated by John C. Calhoun, its systematic elaboration remained for jurists like Otto Gierke, F. W. Maitland, L. Duguit and Roscoe Pound; sociologists such as Graham Wallas, L. Gumplowicz, G. Ratzenhofer, A. W.

Small, R. Michels, and F. Oppenheimer, and such political scientists as A. F. Bentley, C. A. Beard and H. J. Laski.

This effort to get away from the structure and machinery of government to the dynamic forces behind it and the processes characterizing its operation has, of course, gone much further than the study of group pressures, which is but one of the important phases and types of the newer political science. Political behavior being but an aspect of social behavior in general, its thorough investigation necessitates a study of the principles and patterns of human and group behavior as a whole, namely, the introduction of the psychological approach and an analysis of custom, habit, tradition, patterns of behavior, the relative dominance of emotional and rational factors in social and political behavior, and the problem of the possibility of an artificial or telic control over society and group behavior.[5] The psychological technique has also given new life and more substantial validity to the old theory of Aristotle that some are borne to rule and others to serve. Such assured results as have already come from mental testing have demonstrated beyond all possible doubt that the distribution of human ability conforms to the normal curve descriptive of nature in general. The majority of the citizens of all states fall within the class of the mediocre and defective, while the superior types constitute but a hopeless numerical minority, a fact of real and basic importance which will call for much modification of political theory and practice in the future.[6] But differences of capacity are physical as well as mental, and differential biology must be drawn upon as well as psychology. This leads to the bearing of eugenics and vital statistics, upon politics and the improvement of

[5] See Chapter X by C. E. Gehlke, in Merriam and Barnes (Eds.), *A History of Political Theories: Recent Times.*

[6] C. J. Cannon, in *Atlantic Monthly*, February, 1922, pp. 145-57; W. McDougall, *Is America Safe for Democracy?*; C. C. Brigham, *American Intelligence.*

the body politic in health, vigor and intelligence.[7] Biology also suggests the importance of the problem of the adjustment of population to natural resources in the light of existing economic systems and the prevailing type of technology,[8] something of particular importance in dealing with such problems as immigration and standards of living.

From the fact that a large part of state activity is devoted to the control and direction of material factors in life and the mitigation of the struggle of contending economic interests, it is apparent that political scientists must interest themselves in a study of the natural resources and physical environment of a state, and their relation to the material prosperity and economic life of the citizens. This has led the more progressive political scientists to take an active interest in the work of the anthropogeographers from Ritter to Ratzel, Semple, Huntington and Brunhes. This has shown that the economic problems which will need attention by the state depend for their nature and character upon the type of natural resources available, the technology at hand to exploit them, the topography and climatic characteristics, and the location of the state in regard to raw materials and markets.[9] In devoting more attention to economic factors in the shaping of political institutions and the creation of significant problems for the statesman, political scientists are but attacking with a greater fund of information and a more adequate methodology a problem which has been recognized by writers on political science from Aristotle to Madison and Calhoun. While the doctrine of the economic determination of all political life may be an exaggeration of a useful concept

[7] *Evolution in Modern Thought* (Boni and Liveright), Chap. X; F. H. Hankins, "Individual Differences and Democratic Theory," in *Political Science Quarterly*, September, 1923; A. A. Tenney, *Social Democracy and Population*.

[8] See for example such books as A. M. Carr-Saunders, *The Population Problem;* E. B. Reuter, *Population Problems,* and E. M. East, *Mankind at the Cross-Roads.*

[9] See a review of the literature in the article on "Geography and History," in *Journal of Geography*, December, 1921, and the Chapter XII by F. Thomas, in Merriam and Barnes, op. cit.

and working hypothesis,[10] yet to the present time political scientists have unquestionably neglected rather than overemphasized the economic factor in politics.[11]

It has also become convincingly clear that it is impossible to understand aright political institutions except when viewed in a genetic manner, namely, in the light of their history. The desirable threshold to the history of the state has been provided by anthropology which has indicated the methods of primitive social and group control, described the antecedents of the state, and produced the proper temporal perspective for viewing and estimating the problems and processes of political genesis. Above all it has demonstrated the relative recency and modernity of the state as it is conceived in the terminology of political science.[12] A more dynamic type of history has also aided political scientists in pursuing the genetic method. The older history, with its concentration on episodes and anecdotes, on dynastic changes, military strategy and battles, diplomatic negotiations and treaties was of singularly little value to political scientists interested in the growth of political institutions and their interrelation with the genesis of other types of institutional life and culture. But the more recent trend in history towards an interest in the development of institutions and culture has gradually placed at the disposal of political scientists an ever larger body of pertinent material bearing upon political genesis and the shaping of political life by synchronous forces and tendencies in other phases of human life and activity.[13] The

[10] See the critique in E. R. A. Seligman, *The Economic Interpretation of History*, and Walter Lippman, *Public Opinion*, Part IV.

[11] See the stimulating and suggestive summary in C. A. Beard, *The Economic Basis of Politics.*

[12] See A. C. Haddon, *The History of Anthropology*, and such works as A. A. Goldenweiser, *Early Civilization;* R. H. Lowie, *Primitive Society;* A. L. Kroeber, *Anthropology*, and particularly the chapter by Goldenweiser in Merriam and Barnes, op. cit.

[13] See J. H. Robinson, *The New History;* article "History: Its Rise and Development," in *Encyclopedia Americana*, Vol. 14; and chapter by H. E. Barnes in E. C. Hayes (Ed.), *Recent Developments in the Social Sciences.*

net result of this contribution to politics from anthropology and history has been to show the evolutionary and dynamic character of political institutions and to render null and void for all time the assumptions in the field of politics based upon absolutistic and static premises and methods.[14]

As has been suggested above, the state is but one among many forms of human association; hence, it is essential for the political scientist to familiarize himself to some degree with the causes, nature and types of groups and associations in society as a whole. The fundamental principles of group life, functioning and contacts not only apply in one way or another to the state and its constituent agencies, but it is also necessary to understand their operation in order intelligently to comprehend the problems connected with the relation of the state to other groups, or the attempts at state control over other human associations. This necessitates an acquaintance with sociology on the part of the up-to-date political scientist.[15]

But all of these new modes of approach to the study of political and allied institutions and processes can no longer safely be pursued according to the old *a priori* or deductive method of the political philosopher. The observational method of the natural sciences must be introduced into social and political investigation if the modern study of politics is actually to be political science and not political philosophy. The basis for this technique has been provided in the statistical method which was first organized and applied to political phenomena in a systematic fashion by Quetelet in the first half of the last century, and in the social survey which was systematized by Frédéric Le Play and his associates a half century ago. More and more this quantitative method is making its way into the study of

[14] See for example H. Spencer, *Principles of Sociology*, Vols. I-II; W. Bagehot, *Physics and Politics;* E. Jenks, *The State and the Nation;* F. Oppenheimer, *The State.*

[15] H. E. Barnes, *Sociology and Political Theory;* R. M. MacIver, *Community: A Sociological Study.*

political institutions and processes, as is attested by the vast body of statistical material collected by governmental activities, and is serving to put political science on a truly factual and inductive basis.[16]

Two other aspects of the newer political science require at least passing mention. One is the growing conviction that no state lives unto itself alone. This means that the political institutions of one country can scarcely be understood except in the light of the recognition of much borrowing and interchange of ideas and practices with its neighbors. Even more important is it to understand that dogmas made concerning the state which rest upon the thesis of the absolute independence and omnipotence of the individual state are extremely shaky and dubious. The economic realities of contemporary civilization, together with other scientific and cultural facts of international scope and character, are ever emphasizing more clearly and definitely the elements of international interdependence in contemporary civilization. Particularly significant is the bearing of this point upon the older doctrine of absolute and unlimited state-sovereignty. It would seem that in spite of the continuing importance of studies of national and local governmental problems, the scientific point of view in political science must progressively become an international one.[17] And, finally, in the growing popularity of political theory one may detect the dawning consciousness that political science comprehends the study of political ideas as well as political structures and functions, and that these ideas have had an important influence upon political

[16] See J. Koren (Ed.), *A History of Statistics;* F. H. Hankins, *Adolphe Quetelet: Statistician;* C. A. Ellwood, "The Le Play Method of Social Investigation," in *American Journal of Sociology,* Vol. II, pp. 662ff.; and *Quarterly Publications of the American Statistical Association,* Vol. XIV, pp. 1-121; Vol. XV, pp. 225-91.

[17] See Chapter IV by E. M. Borchard in Merriam and Barnes, op. cit.; and concrete evidence to support this position in the various books on comparative government by Ogg, Graham, Lowell, Rogers, Macy, and others. Synthetic books like those by Jenks and Holcombe ars even more illuminating in this regard.

institutions and political practices. But it is equally well recognized that the study of political doctrine cannot well be separated from the cultural environment of the theory or its author.[18]

III. Some Leading Problems in Contemporary Political Science of Particular Relevance to the Social Studies

1. *The Historical Evolution of the State.*

In spite of the fact that history in the past has been primarily devoted to topics and individuals in the political field, and although the history of the state is certainly one of the most important aspects of political science, it is a rather striking fact that neither the historians nor the political scientists have, when compared with the activities of anthropologists and sociologists, made notable contributions to our present authoritative knowledge concerning the origins and development of the state. The great majority of political historians have dwelt so much at length upon irrelevant episodes and personalities that they have provided little significant information concerning institutional development of any sort. Occasionally a political historian like Bishop Stubbs managed fairly well to subordinate episodical and biographical material to the delineation of the picture of constitutional development, and some such as Waitz, Gneist, Fustel de Coulanges and G. B. Adams actually produced institutional political history, but such writers were the exception rather than the rule in historiography whose anecdotal and episodical traits varied from

[18] H. E. Barnes, *Sociology and Political Theory*, Chap. XIII; and the various works on the history of political theory by Janet, Dunning, Gettell, Coker, Merriam, Pollock, and others.

Freeman to Carlyle. Further, even such historians as Waitz devoted their attention primarily to the history of particular states or constitutions and made little or no attempt to work out syntheses of general import or significance. And even where this was attempted as by Herbert Baxter Adams and his associates, for example, the work was based upon subsequently discredited premises such as unique Aryan political institutions, the origins of democracy in the Teutonic folk-moot, and the coherent and integrated migration of political institutions from the Black Forest to Chestnut Street, Philadelphia. The political scientists have done even less in the way of tracing political genesis. Maine's effort has long since been undermined, and Woodrow Wilson's attempted rejuvenation of the patriarchal theory a generation after it had been punctured by Bachofen and McLennan is one of the curiosities of methodology in political dynamics. Far and away the most important historical studies made by political scientists have been those executed by the juristic group concerned with the history of law and legal systems, such as Brunner, Viollet, Pollock, and Maitland.

The provision of our knowledge of the antecedents of the territorial state in the period of primitive society has been the contribution of the anthropologists, particularly since the days of such men as Bachofen, Tylor and Morgan. The theory concerning the origin of the state generally accepted down through the middle of the last century was that specified in the Bible and sponsored by Aristotle, Bodin, Locke, Blackstone, and Sir Henry Sumner Maine, namely, the patriarchal organization of early society and its transformation into the elementary forms of civil society. This doctrine was shattered in 1860 by J. J. Bachofen who established the fact of very early examples of tracing relationship solely through the maternal line, and contended with less substantial foundations for the

belief, that the earliest form of state had been a matriarchate or government by females.[19] His notions as to the existence of a matriarchate were soon proved false by McLennan, Morgan and others, but he had established the reality of female descent in primitive society. The later anthropologists busied themselves in an attempt to establish an assumed order or sequence of transformation from maternal to paternal society. It was assumed that there was an original state of promiscuity, which was supplanted by a kinship society based upon maternal descent, which was in due time superseded by paternal descent and domination, largely effected through the appearance of wife capture and wife purchase. In due time the paternal society developed into the classical type of patriarchal organization through the strengthening of the power of the dominant male, and the economic evolution which gave his domination a more substantial material basis. This accepted doctrine as to primitive social genesis was most thoroughly and impressively summarized by Lewis Henry Morgan in his *Ancient Society*.[20]

Unfortunately, the methodology of these early anthropologists was faulty. They constructed their scheme of social evolution in advance of the facts, and then selected and assorted facts to substantiate their prearranged plan of development. In due time anthropology was put on a scientific and inductive basis, chiefly through the efforts of Franz Boas and his disciples and students. Insisting upon a survey of the data prior to a formulation of theory and synthesis they first devoted themselves to a study of primitive culture areas in the field and to a discriminating appraisal of the concrete descriptive material gathered by others. Then followed a period of assembly of facts, analy-

[19] On the doctrine of the matriarchate by Bachofen and later writers see M. M. Knight, "The Matriarchate and the Perversion of History," in the *Journal of Social Forces*, May, 1924.

[20] Morgan's views have been in part more recently and discriminatingly defended by W. H. R. Rivers in his *Kinship and Social Organization*.

sis, and such synthesis as the facts would sustain. Even before this time, E. Westermarck had proved false the assumption of universal primitive promiscuity. The Boas "school," made up primarily of Wissler, Lowie, Goldenweiser and Kroeber as far as a study of primitive social organization is concerned, demonstrated that kinship society tracing descent through either males or females exclusively was certainly not universal in primitive groups. Certain extensive areas have merely a family-local-group organization with bilateral inheritance and descent. Further, there is no convincing evidence that maternal descent accompanies a more primitive layer of culture than the paternal. Some of the most advanced of primitive peoples —such as the Iroquois—have been characterized by maternal descent, while some of the most backward have been based on paternal descent. Then, there is little or no evidence that maternal inheritance has ever been replaced by paternal in any specific group except through borrowing the paternal inheritance system from an adjoining group. This widely assumed transition thus appears to be an anthropological fiction. Neither is there any evidence for the universality of a strong patriarchal organization in advanced primitive societies. The transition from primitive society to the beginnings of state, thus, seems to have been made from the starting-point of the maternal group, the paternal group and the local group with bilateral descent. Finally, the critical anthropologists have shown that the transition from kinship to civil society was by no means a sudden or abrupt one. It was prepared for in primitive days by the development of various forms of semi-public groupings and organizations which cut through the ordinary kinship lines.[21]

[21] R. H. Lowie, *Primitive Society*, represents the best summary of the newer facts and interpretations. The history of changing doctrines and methods in the field is best set forth by Goldenweiser in Merriam and Barnes, op. cit., Chapter XI.

The theory of the origin of civil society which was generally accepted by the older anthropologists was that of a conscious transition from tribal relationships to a polity based on territorial foundations, such a change as was effected by Cleisthenes in Athens and alleged to have been executed by Servius Tullius in Rome, or of a gradual evolution of the tribal patriarch into the king. This conception was thoroughly undermined by the anthropo-sociologists who have demonstrated that in the great majority of cases the territorial state has been the product of physical force and the superimposition of the power of a conquering group upon the conquered. This view had been suggested by Polybius, Hobbes (as an alternative to the contractual method) and Hume. It was still further elaborated by Adam Ferguson in his *History of Civil Society,* probably the most significant contribution to historical sociology and politics in the eighteenth century. Herbert Spencer gave the theory his attention and commendation in his *Principles of Sociology,* where he held that the first type of state was the military stage specialized for war, and Walter Bagehot, in his *Physics and Politics,* arrived at a similar interpretation of political origins in his chapter on "The Nation-Making Age." But it remained for Ludwig Gumplowicz in his *Rassenkampf* and other writings to develop the thesis in its modern completeness and convincing character. His interpretation was accepted with qualifications by such writers as Ratzenhofer, Small, Ward, Oppenheimer and Jenks, and is today regarded as *the* historical explanation of the genesis of the modern territorial state.[22]

Some modern writers, falsely believing it possible to transfer the mechanisms and processes of individual organic evolution to the field of social evolution, have exaggerated this useful contribution by dogmatically assert-

[22] See the article in Gumplowicz and this group in the *Journal of Race Development,* April, 1919.

ing that war is an indispensable constructive force in human society comparable to the struggle for existence in the organic realm, and by contending that proponents of pacifism and international organization are endeavoring to interpose obstacles in the path of the chief progressive and civilizing agency in social evolution. This so-called "social Darwinism" [23] has been appropriately and effectively challenged by such biologists as Nicolai, who have shown the logical and scientific fallacies in attempting to lift interpretations bodily from the organic realm and to apply them to human society;[24] by sociologists like Novicow, who have indicated the large influence of peaceful economic factors in creating the state and have argued that while conflict is a constructive factor in social evolution and the development of civilization, it must be continually elevated in form from the crude physical warfare of primitive and ancient times to the economic and cultural competition characteristic of the highest civilizations of today;[25] and by other sociologists, among them Ratzenhofer, Small and Vaccaro, who maintain that in the process of social and cultural development conflict is ultimately adjusted and leads to co-operation and adaptation, the realization of which is the real sociological definition and conception of civilization.[26] The prevailing opinion among competent students today is, then, that war has become an anachronism, that the absolute national state is but an epoch or stage in social and political evolution, to be superseded by some form of world organization which will put an end to war and its attendant savagery and suffering.[27] This conclusion does not, of course, prevent the judicious sociolo-

[23] Incorrectly designated, for Darwin never sanctioned such views.

[24] G. F. Nicolai, *The Biology of War.*

[25] Novicow, *Les Luttes entre sociétés humaines;* and *La Critique du Darwinism social;* see the *Journal of International Relations,* Vol. XII, pp. 238-65.

[26] See especially A. W. Small, *General Sociology;* and M. A. Vaccaro, *Les Bases sociologiques du droit et de l'état.*

[27] See in particular, L. T. Hobhouse, *Questions of War and Peace;* and G. Wallas, *Our Social Heritage.*

gist and political scientist from recognizing the earlier services of war in welding together the small primitive groups and thereby laying the basis for orderly political aggregates and the elimination of the interminable neighborhood wars which characterized primitive society.[28]

In tracing the development of the territorial state the most significant recent advance has been the thoroughgoing demonstration of the fact that the history of the state can be intelligently studied only in the light of the interaction of economic, social and political factors throughout history. The dynamic and discriminating students of anthropogeography have indicated the shifting geographical basis of political development by describing the fen, marsh or highland origin of states where protection could be secured, the fluvial or river-basin site of the first extensive and enduring political societies, the thalassic or sea-coast basis of the more advanced civic organizations of the classical and medieval periods, and the oceanic foundation and world-wide contacts of the modern national states. They have also, of course, stressed the importance of geographic factors in state boundaries, invitation or obstruction to expansion, facilities for contact and interchange of culture and ideas, and natural resources and struggles for raw materials.[29] The modern type of synthetic historian has placed at the disposal of the political scientist interested in the genetic point of view a vast amount of information bearing upon the history of social and economic institutions and processes and their interrelation with contemporary political life and systems. The mere mention of the work of Heeren, Erman, Meyer, Breasted, Petrie, and Jastrow on the ancient Orient; of Glotz, Zimmern, Ferrero, Frank, Dill, Westermann and Rostovtsev on the classical age; of

[28] Cf. G. Tarde, *Les Transformations du Pouvoir;* W. Bagehot, *Physics and Politics.*

[29] For the most thorough assembly of this material in English, see F. Thomas, *The Environmental Basis of Society.*

Fustel, Maurer, Luchaire, Brunner, Vinogradoff, Ashley and Renard on the medieval period; of Lamprecht, Shepherd, Abbott, Weber, Sombart, Tawney, Pollard, Gillespie, J. B. Botsford and Hayes on the origins of the modern age; and of Mantoux, Beard, Shotwell, Hobson, Veblen, Commons, and F. J. Turner on the post-Industrial Revolution age is sufficient to impress one with the magnitude and importance of this contribution to political dynamics.[30] Even more direct has been the service of the economic historians, strictly speaking, such as Cunningham, Schmoller, Levasseur, Webb and Hammond, in isolating and emphasizing the influence of economic factors on the history and mutations of the state.[31] And the historical sociologists, such as Comte, Spencer, Giddings, Hobhouse, Oppenheimer, Kovalevsky and Forrest have done a similar service in indicating the changing social settings of the successive forms of political organization.[32] Therefore, however little political scientists may actually have availed themselves of this new material there is now available and accessible the substantial foundations for an accurate and synthetic history of the state in all its forms and manifestations.

2. *The Racial Factor in Politics.*

While it has been more common for political scientists to overlook or minimize the non-political factors in the state and its development, and while for the most part other types of social scientists have performed the service of insisting upon the importance of considering the biological, geographic, economic, psychological and cultural

[30] Much of this type of historical writing is subject to illuminating comment by Carl Becker in his article, "Some Aspects of the Influence of Social Problems and Ideas Upon the Study and Writing of History," in *Publications of the American Sociological Society*, 1912.

[31] E. R. A. Seligman, *The Economic Interpretation of History.*

[32] See publications of the *American Sociological Society*, Vol. XVI, 1921, pp. 17-83.

factors and elements in the state, political scientists, as well as other social scientists, have been wont to lay great stress upon one assumed element in political life and institutional development which the best modern scholarship is repudiating as a matter of demonstrable positive significance. This is the alleged importance of race as a determining factor in the genesis and character of political institutions and processes. This conception unquestionably was in its origin but the projection into the historic period of the prejudices of primitive man, with his fear and hatred of the stranger. It first appears in the contempt of the Jew for the Gentile and of the Greek for the barbarian. While there were some rather significant developments of racialism and nationalism in the period of the Renaissance, particularly in Italian and German Humanism, yet the first important eruption of this fallacy in modern times accompanied the French Revolution and the reaction of the Conservatives to its doctrines and practices. The Romanticist philosophers had laid the basis for this movement by their reaction against rationalism, their obscurantic emphasis on mystical forces in the genesis of culture and institutions, and their assumption of the unique importance of national character in the history of a people. Burke seized upon this philosophy as the intellectual and theoretical basis of his diatribe against the French Revolution, which rested in part upon a contrast between the orderly development of Anglo-Saxon political institutions and the violence and anarchy characteristic of the French, a position which exactly reversed the French views of a century earlier. This viewpoint of Burke was developed during the nineteenth century into the widely accepted dogma of the remarkable capacity of the Teutonic peoples, including the Anglo-Saxon, for political invention and the erection of orderly and effective civil institutions, and the parallel assumption of the fickleness and incapacity of the French for political

life and public affairs. This theory was developed by such distinguished historians and political scientists as Sybel, Treitschke, the Maurers, Kemble, Freeman and Stubbs, Herbert Baxter Adams, John Fiske and J. W. Burgess. It was met by an equally exaggerated and misleading manifesto for Gallicanism by Maurice Barrès, Paul Déroulède, Léon Daudet, along with so distinguished an historian as Fustel de Coulanges. Nor was the Mediterranean race lacking in champions of its cultural and political ascendency.[33]

In the meantime the racial hypothesis was being nourished and developed with new energy and with a far greater volume of alleged evidence for its justification. The philologists from Bopp to Max Müller assumed that they had established the affinity and unity of culture and language for the peoples of India and Europe, particularly the Germanic peoples of Europe. This culture and linguistic group came to be known as the Aryan, and Müller was rash enough to hazard the assertion, later repudiated by him, to the effect that beneath this assumed cultural unity lay identity of physical race. About this same time the suggestive and brilliantly written work of the Count Joseph Arthur de Gobineau on *The Inequality of the Human Races* (1854) defended with great vigor the cultural supremacy of the white race, and particularly the Aryan branch. From this time onward it became a matter of significance to prove a people members of the Aryan ethnic aristocracy. A generation later, however, this was made more difficult to achieve when two German anthropologists and philologists, Pösche and Pencka, showed quite conclusively that linguistic affinities do not prove racial identity beneath them, and, further, that physical differences made it quite evident that not all Europeans could be Aryans. These writers, however, retained the Gobinesque theory of the Aryan ascendency and located the

simon-pure Aryans among the northern Germans and Scandinavians. This did not, however, prevent others from discovering the real seat of the true Aryan culture and race in Europe to be in France, Italy, England and Russia exclusively. The great majority of the philosophies of history and politics in the last half of the nineteenth century were based on the Aryan hypothesis.[34]

In due time scientific students of philology, anthropology and history brought forth evidence which completely discredited the whole body of Aryan mythology. Using data drawn from a study of such groups as the American Indians, where there are more than a hundred widely divergent languages and only one physical race, scholars proved the grotesque fallacy of assuming the identity of race and language. Anthropologists and cultural historians indicated the many instances where the same race had produced very different cultures or where different races had built up remarkably similar cultures, thus showing that the premise of the dependence of culture upon race cannot be sustained. Another assault came from the standpoint of the physical criteria of race.[35] Sergi demonstrated that the Teutonic or Nordic group could not be regarded as Aryans, and discredited for all time the hypothesis of an Indo-Germanic cultural group.[36] Ripley carried the matter still further in a more scholarly fashion by criticizing the various phases of the Aryan hypothesis in the light of the facts of the derivation and distribution of the European races, and by showing that the group that came from cen-

[33] This development can be followed in Dunning, *Political Theories from Rousseau to Spencer;* G. P. Gooch, *History and Historians in the Nineteenth Century;* and T. Simar, *Etude critique sur la formation des doctrine des Races.* There is an interesting article bearing on this subject by J. T. Shotwell, "The Political Capacity of the French," in the *Political Science Quarterly,* 1909, pp. 115ff.

[34] The best brief sketch of these important developments is contained in I. Taylor, *The Origin of the Aryans,* Chap I; and Chapter XIII by F. H. Hankins in Merriam and Barnes, *op. cit.*

[35] There are good discussions of this in R. H. Lowie, *Culture and Ethnology,* and in the works of Boas, Goldenweiser and Kroeber.

[36] G. Sergi, *The Mediterranean Race.*

tral and western Asia and brought into Europe the so-called Aryan culture and language, was in all probability the round headed Alpines, consisting mainly of the Celtic peoples and Slavs who had earlier been held up to contempt by the Nordic and Anglo-Saxon "Aryans." [37] Professor Boas, while not denying that there might be distinct differences between the various physical races as far as their cultural expression is concerned, showed that the present divergencies in their cultural achievements might be adequately explained on other grounds than innate superiority or inferiority.[38] It was further indicated that differential biology and psychology proved that greater differences were to be found between members of the same race than those assmed to divide and separate the different races.[39] And whatever the differences in innate ability between the races, we have not yet studied the problem in a sufficiently scientific manner to be able to arrive at any definitive conclusions.[40] And all studies of this nature must take into consideration the very important matter of the *adaptation* of the racial traits to the particular environment in which the race was originally differentiated.

In spite of the progress of scientific method in dealing with the problem of race the most vicious and absurd development of the racial psychosis has appeared within the present century and particularly in the last decade. The basis was laid for it by the eulogy of the Teutonic race by the renegade Scotchman, Houston Stewart Chamberlain in his suggestive, if preposterous, *Foundations of the Nineteenth Century*. As Chamberlain claimed all western cul-

[37] W. Z. Ripley, *The Races of Europe*, especially Chaps. VI, XVII.

[38] F. Boas, *The Mind of Primitive Man*, Chap. I.

[39] See the writings of Galton and Pearson, and of the differential biologists and psychologists in general. Cf. Chapter XIII by F. H. Hankins in Merriam and Barnes, op. cit.

[40] A good illustration of the scientific mode of approach to this problem of ascertaining the fact of differences of intellectual capacity among the various races is to be found in Kimball Young, *Mental Differences in Certain Immigrant Groups*. For the best results such studies would need to be carried out among peoples in their own native habitat.

ture for the Germanic peoples he found it necessary to give up the strict physical criteria of race, thus making it possible to claim any distinguished European past or present for the Teutonic exhibit. But in Madison Grant's *The Passing of the Great Race,* Chamberlain's claims are united with an acceptance of the physical limitation to the Nordic blond group, who are assumed to have built up all significant western cultures, and to have been characterized in particular by special capacity in politics and war. The doctrine has been widely espoused in this country, having been progressively applied and debased in Burr's *America's Race Heritage* and Gould's *America: A Family Matter,* until now Mr. Eckenrode disfigures an otherwise useful book by exploiting the Nordic myth to explain the causes and outcome of the American Civil War. Even such reputable psychologists as William McDougall and C. C. Brigham have succumbed to the delusion to an astonishing degree, and the present immigration act is based upon a tacit acceptance of the premises of the Nordic protagonists.[41]

In spite of the surprising vogue of this misleading conception it cannot stand before the assault of the most elementary logical principles and historical facts. The great civilizations of the ancient Orient, which were perhaps distinguished above all else for their military and political achievements were without exception non-Nordic in racial derivation and constitution. Medieval political institutions were based quite as much on the non-Nordic Gallo-Romanic antecedents as upon the Teutonic contributions. The first well organized monarchy of the middle ages was established in France. In the age of Louis XIV the Germanic peoples were but an unorganized conglomeration of petty principalities, and the English were looked upon as a nation of anarchists. Even if one were to accept the premise of the unique political or cultural capacity and

[41] This material is lucidly assembled and criticized in F. H. Hankins, *The Racial Basis of Civilization.*

potentialities of the Nordic, Alpine or Mediterranean race, this would be of no avail or relevance in the interpretation of the culture or political institutions of any major European state with the possible exception of the Scandinavian states and Russia. Germany is nearly as much Alpine as Nordic; France is a mixture of Nordic, Alpine and Mediterranean strains, with the Alpine predominating; and Italy is a mixture of Alpine and Mediterranean, as are most of the Balkan peoples. Hence, whatever may ultimately be discovered concerning determinate and demonstrable racial difference, we cannot hope to have this material of much service in constructing a racial interpretation of European or American history, and the scientific cultivation of politics and social science must be founded upon a repudiation of the whole mass of nonsense concerning the racial hierarchy in history. In the words of Professor Hankins, "an ounce of eugenics is worth a pound of race prejudice" in social science and practice.

3. *The Forms of the State and the Government.*

In political philosophy and the older political science much of the attention of writers was devoted to such questions as the distinction between the state and the government and the various possible forms of each, usually conceived as monarchy, aristocracy and democracy with their respective perversions in tyranny, oligarchy and anarchy. No little space was given to the changes from one to another, assumed as inevitable in the recurrent cycles of government postulated by classical writers on political theory. In early modern times when absolute monarchy was replacing feudalism, and later when representative government was challenging monarchy and written constitutions were being forced on chastened monarchs by the *bourgeoisie*, there was much discussion as to the nature and advantages of a monarchy versus a republic. With the

rise of the proletariat in urban centers and the development of the frontier society in the United States in the nineteenth century, interest shifted to the problems of democracy and its feasibility. Technical political science as represented by such a manual as that of Professor Burgess was largely occupied with an analysis and definition of such forms of government as the presidential and the parliamentary, unitary (or centralized) and distributive, federal and confederate, direct and representative and so on. Woodrow Wilson, A. B. Hart, and others have made much of the distinction between a government of laws based on a written constitution and conforming to specific limitations and precedents, and a government of men founded upon essentially unlimited power and infinite diversity of policy and procedure as long as supported by public opinion. Such portions of these treatises as were not devoted to these definitions and classifications were normally largely given over to a further description of the structure of the various forms of government, treating such questions as to the nature and powers of the executive, the existence and advantage of a unicameral or bicameral legislature, the number of representatives in each house and the mode of their choice; the nature, mode of selection and powers of the judiciary; the relations between the three departments as to ascendency, leadership or balance of powers, and the prevailing practice as to suffrage.

In the dynamic political science of the present this sort of analysis plays a far less important part. Not that modern political scientists deny the value of consistent and accurate classification or of precise definition, but it regards this stage of political science as largely a completed task and finds other problems intriguing its attention. There is, however, a certain tendency to challenge the validity of much of this earlier exact classification and to view it as the partially impossible effort to coral and confine under

exact and static rubrics, captions and categories human institutions which are characterized beyond all else by diversity, variety and change. In many cases they scarcely correspond to reality. England is classified as a monarchy and the United States as a republic, but the power possessed by George V in 1918 was most insignificant as compared with that exercised by Woodrow Wilson, and the government is much more susceptible to popular control in England. The United States has been classified as a republic since its origin, but its nature under Washington and Andrew Jackson was vastly different, and nothing could contrast more than the power wielded by Rutherford B. Hayes as president and that asserted by Mr. Roosevelt. Theoretically there is a sharp division of governmental powers in our system, but actually it has never existed with any completeness, and at one period or another president, congress or supreme court has overshadowed the other two departments. Nor is a liberal suffrage law any proof of democracy. France allowed approximately universal male suffrage under the Second Empire, and the suffrage arrangements in the German Empire from 1871 to 1918 were much more liberal than those in Great Britain. Democracy is theoretically regarded as the rule of all the people, or at least of a majority of the people, but acute observers are already suggesting that this is an illusion which cannot square with the scientific facts regarding the distribution of ability in human society and the essential machinery of political operations. As Professor Michels has demonstrated at length democracy cannot function in large national states without representation, but representatives tend to lose a sense of their responsibility and to develop group arrogance and an oligarchical spirit having the deception, cajoling and pacification, rather than the actual representation of their constituents as their real objective.

[42] R. Michels, *Political Parties: A Sociological Study of the Oligarchical Tendencies of Modern Democracy.*

Democracy, then, seems inevitably to beget oligarchy.[42] Graham Wallas has shown how the politicians are able to "get away with" such conduct through their exploitation of the emotional potency of party shibboleths, phrases and symbols which attract the loyalty of the exploited[43] and paralyze their critical powers. And Professor Giddings, on the basis of differential biology and psychology, has advanced the thesis that whatever the form of government the ablest and most alert few will always dominate the state.[44] And the far-famed and much emphasized distinction between the government of men and the government of laws holds only in a rough way. Under Abraham Lincoln, Theodore Roosevelt, Woodrow Wilson, Palmer or Daugherty, the United States has certainly been at least temporarily converted into a government of men, and not without marked gains at times and in certain respects.

One could proceed almost indefinitely with these illustrations of the manner in which the flexible, plastic and varied facts of human nature and society flaunt the exact and specific categories of political epistemology and logic. but a much more important reason for the present lack of absorbing interest in classifications of forms of the state and the government is to be found in the shift of interest from the study of the form and structure of government to the problems of its functions and processes. And these remain much the same beneath many changes in structure; in all cases it is the age-old task of adjusting and reconciling the conflicting interests of social groups, whatever differences may have appeared in the nature, extent and variety of these interests or in the technique which the groups have developed to advance them. Mr. Bentley has well stated the attitude of the more progressive students of

[42] *Human Nature in Politics.* See also W. Lippmann, *Public Opinion.*
[43] *The Responsible State,* p. 19.
[44] A. F. Bentley, *The Process of Government,* pp. 160, 320.
[45] See G. H. Blakeslee, "Will Democracy Alone Make the World Safe?" in *Journal of Race Development,* 1918.

political science on this subject of the study of the form and structure of political institutions:[45]

"Set opposite to all the various forms of the psychological interpretation, we have a dead political science. It is a formal study of the most external characteristics of governing institutions. It loves to classify governments by incidental attributes, and when all is said and done it cannot classify them much better now than by lifting bodily Aristotle's monarchies, aristocracies, and democracies which he found significant for Greek institutions, and using them for measurements of all sorts and conditions of modern government. And since nobody can be very sure but that the United States is really a monarchy under the classification or England really a democracy, the classification is not entitled to great respect. Nor do the classifications that make the fundamental distinction between despotism and republics fare much better. They lose all sight of the content of the process in some trick point about the form.

Whenever and wherever we study the process of government we never get away from the group and class activities, and when we get these group activities properly stated we come to see that the differences between governments are not fundamental differences or differences of principle, but that they are strictly differences of technique for the functioning of the interests, that they are adopted because of group needs, and that they will be changed in accordance with group needs."

It is also coming to be recognized that only the most bankrupt and superficial type of political thinking can maintain that the mere external form of government is any test of its excellence. Much more significant is the question of the breadth and validity of the policy of social welfare and well-being which it promotes and the efficiency exhibited in the execution of such a policy. Much was made in 1917-18 concerning the alleged infinite superiority

of the American democracy over the German imperial system, yet every calm and fact-respecting student will probably have to admit that an abyssmal gulf separated the German and American governments in 1914 as to constructiveness and comprehensiveness of public policy and achievements, and administrative efficiency and morale. It has been urged, of course, that while an autocracy or bureaucracy may be more efficient it tends towards militarism and aggression and is not susceptible to popular check and control of corruption. But such arguments receive little confirmation from facts. The French democracy in 1914 permitted as virulent a military aggressiveness as the autocracies of Austria, Germany and Russia, and no brief for the pacifism of democracies can be built up from a study of the United in 1898 or Great Britain in 1900.[46] As for corruption and graft, a petty functionary in so unimportant a sub-department as the Veterans' Bureau abstracted far more money in two years in the United States than was spent at court during the entire reign of Louis XV in France, long heralded as the supreme example of monarchical extravagance, not to mention the great scandals of the war period. It would seem that in all probability this study of the actual programs and policies of governments will soon be combined with a study of governmental functions and processes as the chief center of interest of the progressive political scientist.[47]

4. *The Functions of the State.*

Few problems have attracted more attention from political philosophers and political scientists than the question of relation of the state to social progress and the legitimate functions of the state in regard to interference in social,

[47] For example, it will probably not be long before such subjects as those covered in Parts III-IV of F. A. Ogg's *Economic Development of Modern Europe* will be regarded as of more vital consequence to the political scientist than the material in his *Governments of Europe.*

economical and ethical matters. Opinions have varied all the way from the eulogy of state activity by Mercantilists, Cameralists, State Socialists and Marxians to the extreme individualism of Wilhelm Von Humboldt and Richard Cobden. For the most part views on this subject have been dogmatic and based on *a priori* premises and assumptions with little of the relativistic and comparative viewpoint in evidence. There is, of course, no sound basis for any dogmatic position as to the contribution of the state to social progress. By supplying the indispensable minimum of physical force and coercion to secure order and prevent the conflict of interest groups from degenerating into anarchy and the destruction of civilization, the state creates the basic prerequisites of all culture and progress. But how far mankind will be advanced by an intrusion of the public authority into realms of action which might be passably exercised by private individuals obviously depends upon a multitude of special circumstances such as the degree of culture and relative equality of knowledge and possessions among the population, the number and complexity of the problems demanding attention and solution, the efficiency of the particular state at a given time, and the probability of maintaining or increasing the morale and effectiveness of public agents. Even more would depend upon the degree to which the state devoted its wealth and power to fostering scientific activity, invention and other dynamic factors in society, and to making these available in the highest possible degree for the betterment of the body of citizens as a whole.[48]

Equally futile and unscientific is it to indulge in absolutistic generalizations as to liberty versus authority and natural rights of individuals. The degree of liberty and personal initiative which can legitimately be allowed de-

[48] See the history of this discussion in W. A. Dunning, *Political Theories from Rousseau to Spencer;* and H. E. Barnes, *Sociology and Political Theory,* Chap. X.

pends upon the same large number of social circumstances which were mentioned above in regard to the contributions of the state to social progress. Liberty is not an abstract principle functioning in a void but the resultant of the interaction of fundamental sociological forces, the facts of human nature, and the specific factors and elements in some particular period or situation. Further, the degree of liberty which can be permitted in times of peace and plenty must usually be temporarily curtailed when society faces such a crisis as that afforded by war, famine or some cataclysm of nature. Similarly, modern social science rejects the metaphysical doctrine of primordial natural rights which was embodied in much eighteenth century political theory, even though such concepts dominate much contemporary juristic theory and practice. The only valid doctrine of natural rights is to be found in the fact that the process of social evolution may reveal certain types of individual immunities and a certain degree of individual liberty and initiative to be most conducive to social progress and efficiency. It will, however, be quite evident that the nature and amount of such immunities and liberties will be determined by the different facts of the various historical circumstances and social surrounding and will not be uniform for any two cultural groups or fixed and stable for any group over a long period of time. The theory of liberty and rights must, then, be revised in light of political dynamics based on the concepts, processes and mechanisms of social evolution.[49]

Exactly the same approach must be made to the analysis of the problem of the legitimate functions of the state. Professor Giddings is unquestionably right when he insists that nothing could be more unscientific than a rigid and dogmatic adherence to either the extreme individualistic position or the state socialist contention.[50] Such cir-

[49] See Barnes, *Sociology and Political Theory*, pp. 139-53.
[50] *Principles of Sociology*, p. 353.

cumstances as wide ethnic and cultural differences in the population, sharp differentiation of economic classes, complex and highly developed economic life, and imminent danger from neighbors would invite an increase in the legitimate functions of the state, but the degree to which this would be beneficial and constructive would depend in large extent upon the amount of political intelligence and administrative talent existing on the part of the governing classes. It is highly dubious, for example, whether the present admittedly anarchical and wasteful conditions prevailing in the railroad and coal mining situation in the United States today would be materially improved by the introduction of government ownership and management as long as our present state of governmental corruption and incompetence continues.

This is rather characteristic of the whole problem of state activity at present. There is no doubt that the greatly increased complexity of economic and social life since the Industrial Revolution and the growth of world society have enormously increased the range and variety of problems that can scarcely be handled adequately through private enterprise. Yet there is grave doubt expressed as to whether man has been able to extend his political capacity and experience to a sufficient degree to be able to face with assurance and competence these increased responsibilities and tasks. Our present large national states were constructed as a result of dynastic and national aggression and ambition at a time when society was far simpler and the demands upon statesmanship far less, and it is as yet a quite unsettled problem as to whether human intelligence, as it is available for political service, will prove adequate to cope with these increased problems on such a scale as they are presented by the modern national capitalistic state of western society. Little consolation in this respect has been secured from the results of the recent intelligence

tests giving quantitative verification to the earlier empirical generalizations as to the stupidity and incompetence of the majority in all modern populations, or by the ever-increasing volume of evidence as to the corruption, selfishness and unscrupulousness of the able leaders of contemporary political groups.[51]

5. *Proposals for the Reform and Reconstruction of Political Life.*

These alleged defects in modern political organization and intelligence, in the face of the unprecedented tasks of contemporary society, have suggested a number of expedients and proposals designed to increase the existing political interest and competence. Much stress is laid upon what is known as "functionalism" as a principle of political and social reconstruction, namely, the relinquishment of the attempt to handle all types of social and economic problems through one unified political body or organization and the turning over of legislation, administration or both to specialized groups which are most competent in the field of their own activities and interests. The Gild Socialists propose practical legislative immunity or self-government for producers in modern industrial society, reserving to the state legislative and administrative functions in those fields which concern citizens as consumers, namely, education, insurance and welfare legislation, taxation, public defense, international relations, etc.[52] Many would combine with this a substitution of representative government

[51] This all important problem of the probable discrepancy between the demands made upon political intelligence by modern problems and the capacity exhibited is discussed from various angles in such books as G. Wallas, *The Great Society*, L. T. Hobhouse, *The Elements of Social Justice;* L. Stoddard, *The Revolt Against Civilization;* R. C. Brooks, *Corruption in American Politics and Life;* E. Faguet, *The Cult of Incompetence;* G. D. H. Cole, *Social Theory;* A. W. Small, *Between Eras;* E. A. Ross, *Sin and Society; Changing America;* and *The Social Trend;* S. and B. Webb, *The Decay of Capitalist Civilization;* R. Michels, *Political Parties;* and M. P. Follett, *The New State.*

[52] See G. D. H. Cole, *Self-Government in Industry; Social Theory; Guild Socialism;* and N. Carpenter, *Guild Socialism.*

based on vocations or professions for the present territorial representation. The justification urged for this is that greater interest and pride will be taken in election procedure and more competent representatives chosen.[53] The great difficulty arises when a practical plan for its introduction is considered and some scheme is sought to provide a proper weighting or distribution of representatives according to the various vocations. A somewhat more practicable and promising proposal is that which is sometimes known as administrative syndicalism. This arrangement calls for the continuation of the present system of representation based on territorial units. Legislatures thus chosen will pass measures and decrees of a general nature, but their execution will be handed over to trained and competent administrative boards chosen largely from the groups specifically concerned with the operation of the particular measure. In this way it is hoped that special competence and scientific application may be secured.[54]

Another group of progressive writers has attacked the problem of political reorganization from the standpoint of a rejuvenation of, or an increased emphasis upon regionalism and local government instead of pure functionalism, though in both cases there is new emphasis upon the importance and partial autonomy of the group. One of the major prophets of this development in social and political theory was Frederic Le Play who laid special stress upon the natural geographic region and its economically and socially unified population. This point of view has been taken up by Patrick Geddes, Victor Branford and others and has merged in part with the scientific town-planning program designed to break up the great congestion of modern industrial cities. Others have been more interested in the purely

[53] See the brilliant defense of this system by H. A. Overstreet in the *Forum*, July, 1915, and also in Cole, *Social Theory*.

[54] On administrative syndicalism see H. J. Laski, *Authority in the Modern State; Problems of Administrative Areas;* and *The State in the New Social Order* (Fabian Tract No. 200).

political aspects of the matter and have concentrated their attention on different types and degrees of municipal socialism. The core of the movement, however, is the growing feeling that our modern national states are too large, top-heavy and complex to arouse the interest of the average citizen or to be directed in any significant degree by his available intelligence. By making the local community or group the center of the more important phases of his political life and activity his apathy and indifference can be shattered and his modicum of political acumen and intelligence most intelligently exploited. Above all, legislation of a sumptuary sort relating to morals and conduct should be left to the local group which is most likely to make rules and regulations which it will respect and obey. Likewise socialism and the ownership of public utilities is, in the present state of political competence and intelligence, most likely to prove a success when executed on the small scale of the municipality and its activities. To secure the advantages of large scale political organization for certain desirable types of collective activity and to present a united front in international policy and relations those who stress the value of an increased importance of local governmental powers and autonomy would suggest the utilization of a real system of federalism, which many contend has now well nigh completely disappeared in the United States.[55]

Whatever may be the political future, whether we retain our present system of representative government on a purely territorial basis over a large area, or adopt some form of functionalism or local government scheme, it is quite evident that we shall need greater expert ability in law-making, administration and adjudication alike. This can scarcely be secured without providing for and requir-

[55] Various aspects of such proposals are discussed in theoretical and practical aspects in such books as P. Geddes, *Cities in Evolution;* Geddes and Branford, *The Coming Polity;* C. Brun, *Le Régionalisme;* R. M. MacIver, *Community: A Sociological Study;* M. P. Follett, *The New State;* and *Creative Experience;* F. C. Howe, *Socialized Germany.*

ing special educational training as well as practical experience as a vital qualification and prerequisite for the holding of every type of political office. The academic training required should certainly be based upon a substantial grounding in the social sciences, whatever technical requirements in other branches may be added thereto. The complexity and technical nature of the modern problems which have to be attacked by the government preclude the possibility of their successful solution by the intuitive and idealistic method or technique. This fact has been recognized in the administrative branch of the government and embodied in the ever-improving civil service systems, which are far more highly developed in countries like Germany and England than in the United States. The system will certainly need to be extended to legislators and judges if we are to have efficient and competent government, however difficult it may be to do this. In many ways the need for expert and technical knowledge and a profound grasp upon the general principles involved is greater in the legislative and judicial departments of government than in the administrative. Further, new and improved methods must be found for gathering the facts which are essential for the guidance of the public official in every branch of government and for the formation of an intelligent public opinion to aid the mass of the citizens in arriving at accurate estimates of problems and events. The variety, ramifications and difficulties of modern problems have made it no longer possible for mere honesty of purpose to render adequate service as a purveyor of information. A straight-forward and incorruptible, but uninformed lecture platform, pulpit and press can no longer be relied upon to give when unaided suitable information to the public. We must have fact-finding bodies whose equipment for research is of a sort fitted to cope with the complexity and difficulties of the facts to be discovered. Their discoveries must also have

some avenue for complete, effective and immediate dissemination, something which is not now possible in our press, whether it be controlled by capitalists or laborers, Jews or Gentiles, Protestants or Catholics. This is, of course, by no means a novel or unprecedented contention. Francis Bacon had conceived of a society devoted to research and fact-finding and the subsequent application of such knowledge to human betterment; Comte called for the scientific guidance of the Positivistic commonwealth by highly-trained sociological priests; Proudhon would have put all determination of public policy in the hands of a trained academy of sciences; and Lester F. Ward contended that there could be no scientific government which was not based upon the information supplied by an academy of the social sciences manned by the best-trained social scientists. Perhaps the most effective statement, however, which has been made of this necessity for trained and unprejudiced fact-finding bodies and for adequate avenues of dissemination to the public is that contained in Lippmann's *Public Opinion*.[56] The efficiency of government and the welfare of society will probably be rather closely correlated with the degree of progress made in this matter of supplanting error and prejudice by fact and candor.

[56] See also Lippmann's *Liberty and the News*.

IV. Past and Future Relations of History and Political Science

One of the most famous and influential definitions of history ever offered was that "history is past politics." This has been literally true in two senses. In the first and most generally understood one it has meant that history has been concerned with the political history of the past ages. In another way, and one little stressed or recognized, it is equally true that the concepts of politics which have guided the historian have usually been of a *past* political science. Rarely have historians dealing with political genesis been abreast of the progress in political thought. Usually their preparation has been one or two undergraduate courses in formal political science, which, more likely than not, was anachronistic when dispensed to them in their youth. The exceptional cases of historians who have at the same time been in the vanguard of progressive political science, such as Gierke, Maitland, Vinogradoff, Beard and Turner, are as few as they are distinguished. It is for this reason that a discussion of the development and contemporary trends in political science is likely to be helpful to the political historian.

It would seem that in view of the fact of the primary preoccupation of the conventional historians of the last century with political facts, history should have rendered remarkable services to political science, and, in particular, should have developed the subject of political genesis to a

very high state of perfection. No other body of social scientists produced any such extensive and imposing body of literary achievement as did the historians in the nineteenth century. Yet it remains the solemn fact that all of this vast body of material was of little aid to the political scientist, and that nearly all of the solid contributions to the history of the state and political institutions were made by anthropologists, sociologists, jurists and a few political scientists interested in the genetic aspects of their subject. What little was done by the historians in the way of enriching the subject matter of genetic politics was achieved outside the scope of the conventional historical works by writers of the type of Waitz, Gneist, Stubbs, G. B. Adams, Fustel de Coulanges and other contributors to what is known as constitutional history. The vast majority of normal and usual historical works in the last century, while primarily devoted to matters falling within the political, including the military and diplomatic, realm so faithfully followed the anecdotal or episodical technique that either the events and activities narrated had little or no relation to political evolution, or such relation was in no way made clear. The personal and dramatic held undisputed sway in the selection and narration of events. The contrast between the conventional political history and constitutional history can readily be illustrated by comparing two widely known books by authors of equal distinction in scholarship. The long popular general manual on English history, that by the late Samuel Rawson Gardiner, a *Students' History of England,* was written by a distinguished student of the constitutional struggles of the seventeenth century, yet only a highly-trained specialist in English constitutional history could discover in the book any clue to the development of English political institutions, however thoroughly the reader might find himself informed as to dynastic geneologies, diplomatic chicanery and military strategy. On

the other hand, if one were to pick up the admirable sketch of the development of the English constitution and political institutions by George Burton Adams he would find here in far fewer pages a lucid and illuminating tracing of the changes in English political structure and processes since the tribal period, even though he might well wish for more information as to the social and economic basis of such transformations and developments. Indeed, the conventional political history was so laden with irrelevant personal details that it not only made no significant contribution to genetic politics, but actually obscured this field and often diverted attention from it. The historiographical concepts of the ancients and of the modern romanticists such as Lamartine, Carlyle and Froude, then, brought about the situation which led the historians ignominiously and well nigh completely to forfeit their glorious and unique opportunity of the last century to put the political scientists deeply and permanently in their debt.[57]

But even the constitutional historians were seriously defective in their methodology and interpretations. Their theory of historical and political causation has usually been what is well designated as the "vacuum theory." Political and legal concepts and institutions are looked upon as either existing in the void anterior to man or society and gradually settling down and mingling with humanity, slowly establishing themselves in positions of respect and authority, or as developing mysteriously and independent of any non-political influences in society. Hence the fruitful and vital investigation of the interaction of social, economic and political factors and forces has not been effectively pursued, and the conventional constitutional histories are to a deplorable degree devoid of life, reality and true

[57] There is an acute and generally adequate characterization of this type of historical writing in G. P. Gooch, *History and Historians in the Nineteenth Century*. See also C. A. Beard, *An Economic Interpretation of the Constitution*, Chap. I.

instructiveness. The whole complex of the basic premises of dynamic politics and sociological jurisprudence is ignored, and the history of civilization has no more apparent relation to political history than has political history to the other phases of the development of human culture. This is not only true of the previous generations of constitutional historians; it is equally characteristic of distinguished contemporary writers. Indeed, the two leading writers today on American constitutional history, Andrew C. McLaughlin and E. S. Corwin, fall as much within this classification as any writers who could be selected from the generation of Bancroft.[58]

In the few cases where the question of causation has been considered in political evolution and constitutional development it has been explained on the basis of extremely dubious or anachronistic assumptions, such as the great man theory, the hypothesis of special divine guidance, or the thesis of racial superiority and the special gift of some particular race in the political realm. The first dominated the outlook of men like Carlyle, Froude, Motley and, to a lesser extent, Stubbs; the second was exploited by Bancroft; and the third by Sybel, Fustel de Coulanges, Stubbs, Freeman, Fiske and Herbert Baxter Adams and his school. It is not inaccurate, then, to conclude that whatever its value for biography or aesthetics, the great majority of political historiography has been practically worthless for the political scientist, and will remain so until the material

[58] See the somewhat humorous example in the *American Political Science Review*, February, 1924, pp. 180ff., in which Professor McLaughlin eagerly seizes upon Professor McIlwain's suggestive legalistic interpretation of the constitutional aspects of the American Revolution as a rebuke to all historians who would see any economic element in the struggle, while Professor McIlwain in the very next review enthusiastically commends Dr. J. T. Adams for the admirable way in which he has brought out the fundamental social and economic causes of the revolutionary movement. Professor McLaughlin's argument seems to be that because the legal contentions of the colonists were apparently sound there could be no economic foundation for them. For the wound to Professor Corwin's psyche caused by a vital and realistic study in constitutional history see his review of Beard's "Economic Interpretation of the Constitution," in the *History Teachers' Magazine*, February, 1914.

has been worked over by political and social scientists from the comparative point of view. But even this task has been rendered very difficult because of the vast body of extraneous and irrelevant material of an episodical and anecdotal type which has been dragged in. The magnificent opportunity of historical writing while under the spell of the political fetish to render indispensable and enduring services to political science was thus largely lost because of wrong-headed notions about the desirable content of even political history. What might have been done is indicated by a few such books as Jenks' *The State and the Nation,* Maitland's *Constitutional History of England,* and the fragments by Professor Beard.

While history may make up its past deficiencies in the way of being of real service to political science, it is not likely to do so through a belated execution of numerous and valuable treatises on historical politics. The dominant place which political history has held in the field of historical writing has already been widely challenged, and there is no doubt that in a couple of generations the older type of absorption in political episodes and anecdotes will have become thoroughly discredited. But this will not mean that history will no longer render any services of significance to political science. Rather it will probably have a far more important and vital role to play in this respect. The newer dynamic political science and the modern type of synthetic history have much more in common and much more to gain from co-operation than did the older metaphysical and classificatory political science and the episodical and anecdotal historical writing. Political scientists are coming to understand that the state can be intelligently understood only when viewed in its proper relations to its geographic, economic, social and intellectual setting and relationships, in other words, against the background of human culture as a totality. At the same time historians

are gradually awakening to the fact, under the stimulation of such writers as Lamprecht, Green, Rambaud, Berr, Robinson, Shotwell, Breasted, Smith, Hayes, Becker, F. J. Turner and others of their schools, that the field of the historian is the description and analysis of the genesis of human culture as a whole, however much individual historians may be interested in particular fields or phases of cultural progress. Thus the political scientist who is interested in tracing in a profound and vital manner the growth of the state and political institutions against the background of social, economic and intellectual changes will in due time find that the historians have provided him with cogent and pertinent material in large volume and with accurate content. It is doubtful, however, if any large number of historians, technically and professionally considered, will long continue to maintain a vivid interest in the details of political genesis. The historians are coming to understand that they have actually been intruding on a proper domain of the political scientist, and they will doubtless see fit to observe the proprieties and proper limitations of their field of activity and pass over to the political scientist the task of investigating political origins and developments on the basis of the data furnished by anthropologists and cultural historians. History which is past politics will become also past historiography.[59]

[59] There is a good discussion of the contemporary controversy over these points in the last chapter of Gooch's *History and Historians in the Nineteenth Century.*

V. History and Jurisprudence

Inasmuch as law is a product of the state, and law-making, administration and adjudication the chief functions of the state, it is obvious that what has been said above about the development of political science and its relation to the changing types of history applies with little or no qualification to the relation between history and jurisprudonce. In fact, it is debatable as to whether it is desirable to regard jurisprudence as a special social science distinct from political science. Indeed, probably the tendency so to regard it has been due largely to the development of schools of law separate from faculties of political science, a movement which is chiefly an outgrowth of the fact that we have come to agree that lawyers and jurists need special professional training while no such qualifications or requirements are suggested in respect to law makers or administrators. The political field, perhaps the most complex and technical which today challenges the intellect of man, still remains regarded as the one in which neither training nor special talent is required.

But without pressing this debatable contention that jurisprudence is really a subordinate aspect or department of political science rather than a special and distinct social science, few would deny the applicability of the foregoing generalizations to jurisprudence, provided their validity as related to political science is conceded. Jurisprudence has passed through much the same stages as political science in the course of its development. The natural law school, deriving much of their basic philosophy from Socrates and the Stoics, looked upon law as the imperfect human appropriation of the emanation of divine wisdom—the jur-

istic expression of the *Logos*. It existed in essence prior to human society, and has been in potential form and content the same body of transcendental and normative rules irrespective of time and place. Such differences as existed in legal codes were simply expressive of the varying degree of competence and success in appropriating the legal manifestation of divine wisdom through the operation of the rational nature of man. This metaphysical theory of law played a large part in the political and legal philosophy of the seventeenth and eighteenth centuries, and still flourishes in a somewhat mitigated fashion in many court rooms and in the minds of many jurists to the present time. More popular today, however, is the so-called analytical jurisprudence which took form at the hands of Hobbes, Bentham and Austin, and is concerned with the specific fact of the nature and content of law as the command of a determinate superior, the state. It does not normally deal with such problems as the genesis of the state or law, or changes in the form of either. Nor does it assign any importance to social forces at large which demand, color and support law and legal administration. It rests satisfied with a consideration of what the law actually is at a given time and who are the authoritative agents for its enforcement. It is obvious that this is a concrete and convenient theory of law for the judge and attorney, and that it furnishes an admirable juristic orientation for the purely legalistic type of constitutional historian. It has distinguished modern theoretical exponents, among them the well-known jurist, Thomas Erskine Holland. Yet the analytical jurisprudence, whatever its advantages as a working philosophy of law, furnishes no clue to an intelligent understanding of the origins and nature of various legal codes, and no substantial suggestions as to the necessity or methods of legal change and reform.

The weaknesses of the analytical school of jurists in regard to explaining legal origins and development were overcome largely through the efforts of the historical and comparative schools. The historical school takes its origin from such writers as Burke and Savigny, and has been developed, among others, by Sir Henry Sumner Maine, F. W. Maitland, H. Brunner, J. C. Carter and Sir Frederick Pollock. It looks upon law as the product of the diverse cultural forces inherent in the historical development of the nation. It is the gradually accumulated, selected and codified wisdom of the nation. While in modern times law has come to be more and more legislative enactment and hence the literal command of the state, the nature of the legal system as a whole and the content of much contemporary legislation is determined primarily by the past history of the nation and the peculiar institutions of the particular state which have grown out of that past. The comparative school is simply an extension of the historical method in space. Its exponents contend that the "wisdom of a nation" has rarely been accumulated solely within its own borders. Cultural contacts and borrowing are as characteristic of legal as of other institutions. Hence, one must study from a comparative and historical point of view the great legal systems of the world from the Code of Hammurapi to that of the German Empire as completed early in the present century. The method was in large part suggested by the anthropologists of the comparative school in the last century, such as Lubbock, Tylor, Post and Morgan. Perhaps its chief exponents have been Joseph Kohler and Sir Paul Vinogradoff. It is evident that no sharp line divides the contemporary historical and comparative jurists; men like Pollock and Maitland have done real service in the field of comparative jurisprudence, while Vinogra-

doff has been one of the most productive contributors to historical jurisprudence.

The labors of the historical and comparative schools did much to clear up the problems connected with the origin of law, but they contributed far less to the problem of the application and functions of law, and of the relation of law to social progress and social reform. This service was reserved for the sociological school, which has been largely a product of the rise of that broader and more comprehensive study of institutions and processes which has been brought about by the development of sociology since the time of Auguste Comte. It is not without its significance that the founder of modern sociological jurisprudence, Ludwig Gumplowicz, was also one of the more distinguished of modern sociologists. The leading members of the sociological school of jurists have been Gumplowicz in Austria, Gierke, Kantorowicz and Berolzheimer in Germany, Duguit in France, and O. W. Holmes and Roscoe Pound in the United States. Had Maitland lived, the later trend of his legal interests indicate that he would have become primarily interested in the sociological approach and application. While possessing a healthy and vivid interest in legal origins as the only method of understanding the past genesis and social basis and effects of legislation, the sociological school is far more interested in the present state, applications and results of law. It completely divorces from law any of the supernatural, mystical, transcendental or immutable characteristics which have been assigned to it by earlier schools. It looks upon law as but a natural and secular social product in its origin, and development, and is concerned solely with its present effectiveness as an agent of social control and guidance, including therein a lively interest in all possible means for improv-

ing the assumptions, content and efficient enforcement of law. With this school law comes to have a pragmatic and telic significance. It is regarded as the great instrument of social engineering, and is viewed quite as much in the light of a vital agent in the task of securing intelligently directed social change as of a leading factor in producing social order and stability. Vitally concerned with the actual contemporary effects and operation of legislation and its enforcement, the sociological school emphasizes the necessity of carefully prepared statistical surveys and reports of the legislative product and the administration of law, civil and criminal.[60]

The older political history, while usually deriving its juristic assumptions and definitions, when it had any, from the metaphysical and analytical schools of jurisprudence, really had few vital relations with it. Analytical jurisprudence being in no considerable way interested in legal origins, such minor contributions as the episodical political history might have made to the subject were rarely utilized. Constitutional history of the old sort and analytical jurisprudence both putting the state and law in a social and cultural vacuum for the purpose of detailed dissection or study, there was little need felt on either side for co-operation and little actually to be derived from it. On the other hand there is every reason to expect the most fruitful collaboration between the newer synthetic history and the newer sociological jurisprudence. Social history will do much to illumine the problem as to the social background and results of legislation in the past, while sociological jurisprudence will give to the historian an intelligent and workable technique for studying the history of law and

[60] There is a good brief survey of the various types of jurisprudence in the article on "Jurisprudence" in the *New International Encyclopedia*. The various schools are described and classified by Patterson in Merriam and Barnes, op. cit., Chap. V. The best critical discussions are to be found in R. Pound, *Interpretations of Legal History*, and *Introduction to the Philosophy of Law*.

legal concepts. The future, then, would seem to promise, indeed, to demand much closer and more thorough co-operation between history on the one hand and political science and jurisprudence on the other.

HARRY ELMER BARNES.

NORTHAMPTON, MASS.

INTRODUCTORY NOTE

THE PAPERS that follow were originally prepared with a view to the specific needs of the various sessions of the bicentenary commemoration of Kant held at Northwestern University on December 4 and 5, 1924. They were not written for technical students of philosophy nor, in most cases at least, with a thought of publication either separately or as a collection. The controlling factor in the formulation of the program, moreover, was not the aim of presenting a delicately balanced account of all the elements and phases of Kant's complex philosophy; it was primarily that of paying tribute to a commanding intellectual figure in such a way that classes in philosophy and groups of other students and the interested public might receive illuminating introduction to his personality and thought and a fresh stimulus to, and an enhanced appreciation of philosophic study. It was in response to numerous requests from individuals attending the celebration and with the hope that the addresses might prove of wider interest and value that the publication of the collection as a whole was decided upon. In three instances, as may be noted, writers have preferred to modify somewhat the titles of their papers, but in no case has the content been substantially altered.

To afford some idea of the character of the celebration and of the specific occasions for which the various papers were designed, we append hereto the printed program.

EDWARD L. SCHAUB.

PROGRAM

The general public will be cordially welcomed at all meetings marked by a star. Attention is also invited to an exhibit of portraits, books and other materials assembled for the commemoration in Harris Hall 107.

THURSDAY, DECEMBER 4

12:30 P. M. ..... University Club
Luncheon

*3:00 P. M. ..... Harris Hall 107
The Legacy of Kant (Opening Address)
Edward L. Schaub, Northwestern University
Philosophical Modernism and the Kantian Ethics
G. T. W. Patrick, The State University of Iowa

5:00 P. M. ..... 629 Garrett Place
Discussion Circle, preceding dinner at the home of
Edward L. Schaub

*8:00 P. M. ..... Harris Hall 107
Quartette for Strings, Opus 18, No. 1 ..... *Beethoven*
String Quartette from the School of Music,
Northwestern University
The Literary and Social Environment of Kant
Martin Schuetze, The University of Chicago
Kant, The Seminal Thinker
J. A. Leighton, State University of Ohio

FRIDAY, DECEMBER 5

*10:00 A. M. ..... Chapel, Fisk Hall
The Religion of Kant
E. S. Ames, The University of Chicago

*10:30 A. M. ..... Harris Hall 107
Kant as a Student of Natural Science
S. G. Martin, Northwestern University
Kant's Philosophy of Religion
J. H. Farley, Lawrence College

*11:30 A. M. ..... Harris Hall 107
Kant's Philosophy of Law
E. L. Hinman, The University of Nebraska

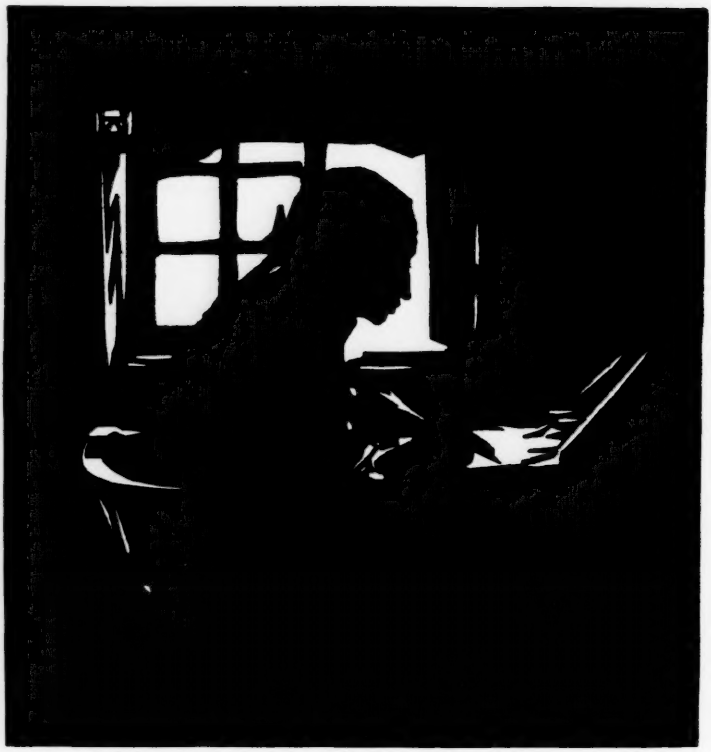
12:30 P. M. ..... University Club
Luncheon

*3:00 P. M. ..... Harris Hall 107
Kant's Doctrines Concerning Perpetual Peace
J. F. Crawford, Beloit College
Sources and Influence of Kant's Aesthetic Theory in England
E. F. Carritt, Oxford University

4:30 P. M. ..... Harris Hall, Social Room
Reception and Tea given by the University Guild for visiting
guests and members of the faculty of
Northwestern University

6:00 P. M. ..... University Club
Dinner

*8:00 P. M. ..... Harris Hall 107
Kant and Koenigsberg (Illustrated lecture)
E. L. Hinman, The University of Nebraska
Kant's Copernican Revolution
Frank Thilly, Cornell University



Silhouette by Heinrich Wolff

Frontispiece to *The Monist*